. 2059 Vol. LIII JUNE 10th, 1948

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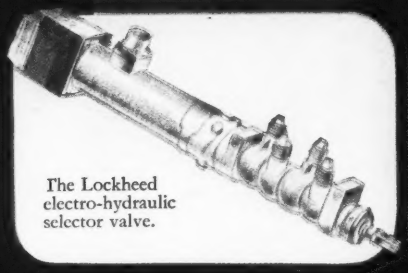
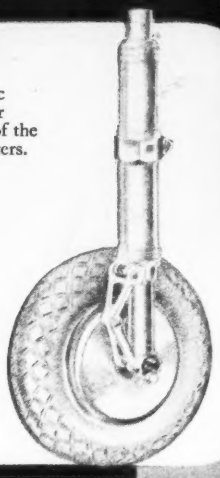
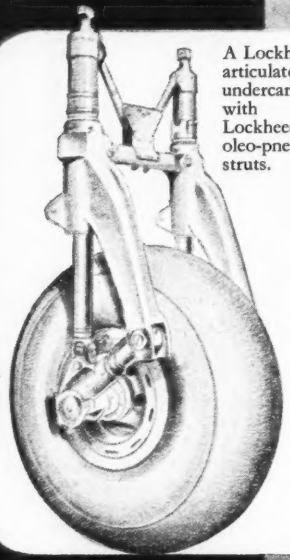


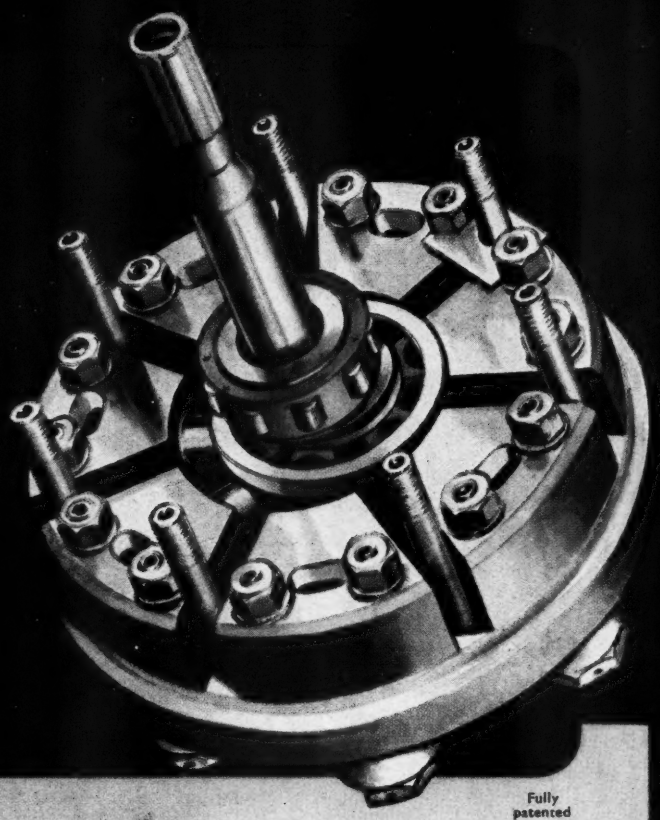
The Lockheed electro-hydraulic selector valve.



A Lockheed oleo-pneumatic shock absorber strut for one of the fastest jet-fighters.



A Lockheed articulated undercarriage with Lockheed oleo-pneumatic struts.



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Among these is the high-precision pump, shown above, which delivers 2½ g.p.m. at 3000 p.s.i. at 3000 r.p.m.: 36,000 of these have been supplied. The Servodyne system, which gives positive and immediate assistance to controls, is another important unit.

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The Pharos, Father of Lighthouses, was constructed at the command of the Egyptian King Ptolemy Philadelphus in about the year 280 B.C. The lofty tower was some 400 ft. high, and in the topmost chamber burned a great brazier to guide mariners.

TERRY'S FOR PRESSWORK

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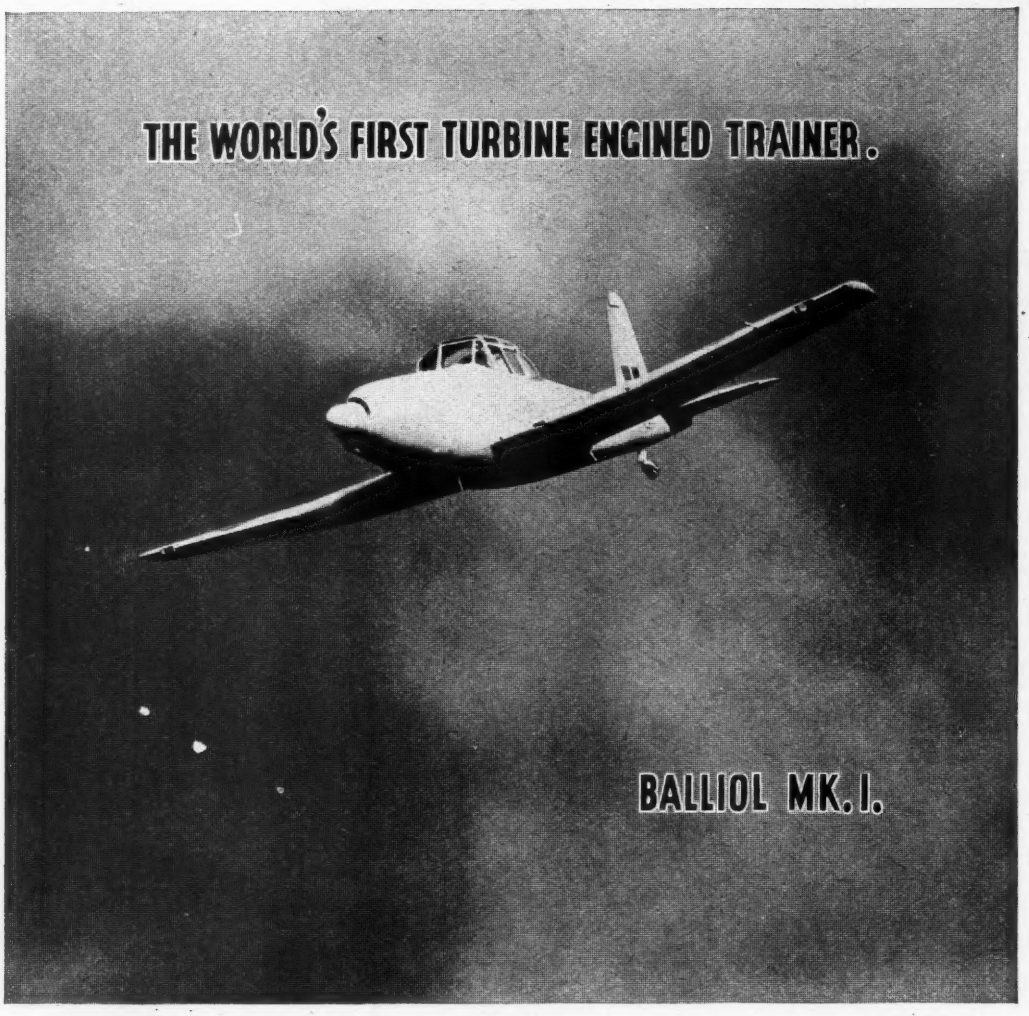

The BALLIOL advanced Service trainer, now undergoing flight tests with the Mamba gas turbine engine, is the world's first single-engine aircraft to be powered by a unit of this class.

The prototype of the BALLIOL, fitted with a Mercury engine, has been flying for over a year and the reliability, manœuvrability and high performance of the aircraft are well established.

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Some Short jottings for airline operators and their crews

The trend to the flying boat . . .

The new Short-Solent route on the Springbok Service

New Springbok Route

Four and a half days of travel in comfort and luxury, over scenes of incredible beauty, are promised by the new B.O.A.C. Springbok service.

After taking over from landplanes at present used on the route, Short Solents will fly from the new flying boat terminal, Berth 50, Southampton; they will call at Augusta, Cairo, Luxor, Khartoum, Port Bell, Victoria Falls, and Vaaldam (Johannesburg). Making an overnight stop at Victoria Falls, passengers will have an opportunity of seeing the panorama of which Dr. Livingstone said, "scenes so lovely must have been gazed upon by angels in their flight."

Livingstone's amazing 'Shangwe,' renamed Victoria Falls

Passenger Comfort at Berth 50 . . .

Passenger comfort has been catered for with all the ingenuity of modern design at B.O.A.C.'s new flying boat terminal. In addition to the well-appointed bar-lounge and restaurant, features of the new terminal are the two flying-boat floating docks approached along covered ways by outward and inward bound passengers.

The bar-lounge, Berth 50, Southampton

. . . at Night-Stops on flying-boat Routes

For long-distance travellers the new B.O.A.C. night-stop accommodation will be a masterpiece of design for maximum comfort. Each air-conditioned bedroom will be self-contained, connected by sliding doors to its own shower and toilet. There are extra-large divan beds, dressing tables, bedside tables, recessed lighting, and radio in every room.

FLYING BOAT PERSONALITIES

CAPT. H. L. M. GLOVER

No. 4 Line, B.O.A.C.

IN 1930 Captain Glover "worked his passage" from New Zealand and entered the R.A.F.

He was with No. 18 Squadron, Upper Heyford, when they escorted the Prince of Wales to the funeral of King Albert of Belgium. In 1937 he joined Imperial Airways, and by July 1938 he was First Officer on Short's Empire Flying Boats on the Durban and Singapore routes. In 1940 he was back with the R.A.F. at Kalafrana, operating in Short Sunderlands.

In 1942 Captain Glover was with B.O.A.C., and he has now logged over 10,000 hours, mostly in flying boats. He now regularly flies "down the routes" on B.O.A.C.'s Hythes and Plymouths.

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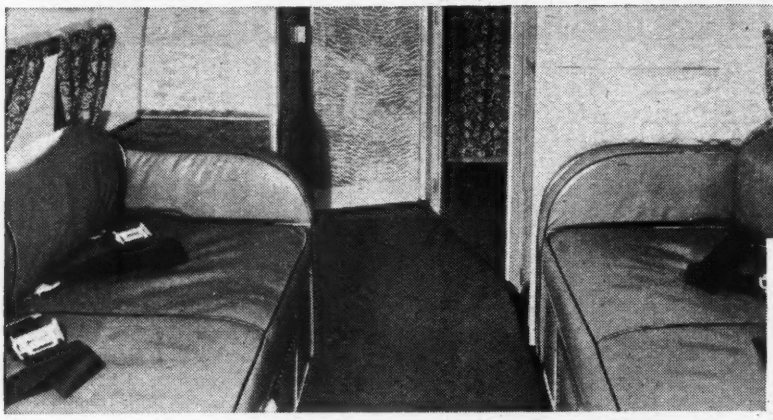
STOP PRESS

Good news for the many who have sent in orders for and enquiries about the Sealand, is that her maiden flight and preliminary tests at Belfast were an unqualified success.

Tasman Empire Airways, who use only Short flying boats on their services, have announced that their enterprise has regularly paid a dividend of three per cent. T.E.A.'s fares have been among the lowest for international airlines, and the airline has been maintained without Government subsidies.

DOUGLAS C.47 EXECUTIVE CONVERSIONS



for **V.I.P.s**

For executive or V.I.P. purposes the Douglas C.47 provides an ideal aircraft. Scottish Aviation Limited, the official Douglas repair, overhaul and conversion centre for Great Britain and the pioneers of this class of work in Europe, have converted a number of these aircraft for this purpose. The illustrations show part of the interior of a conversion recently carried out for H.H. The Prince Regent of Belgium.

C.47 Passenger and Freighter Conversions available from stock.

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QUIZ No. 3

"A piece of machinery has become worn. What would you do with it—throw it away or . . .
Well, what *would* you do, Mr. Foreman?"

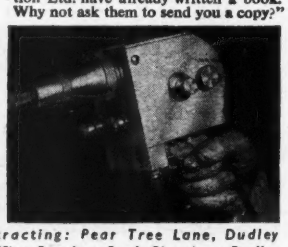
"Throw it away?" Mr. Foreman sounded incredulous. "You can't do things like that in business."

"Turn it into scrap, then," corrected the Quiz Master.

"You don't do that, either," answered Mr. Foreman. "Not nowadays, when you can build things up as good as new, if not better, with metal coatings. Mind you, we always have tried to salvage as much worn machinery as possible—by welding and electro-deposition. But welding causes complications because it requires heat, and electro-deposition is slow and you're limited to size. Metal Spraying is the thing. I could write a book about it."

"Why don't you?" asked the Quiz Master.

"And have people like you throwing it away," snorted Mr. Foreman. "Not blooming likely. In any case Metallisation Ltd. have already written a book. Why not ask them to send you a copy?"



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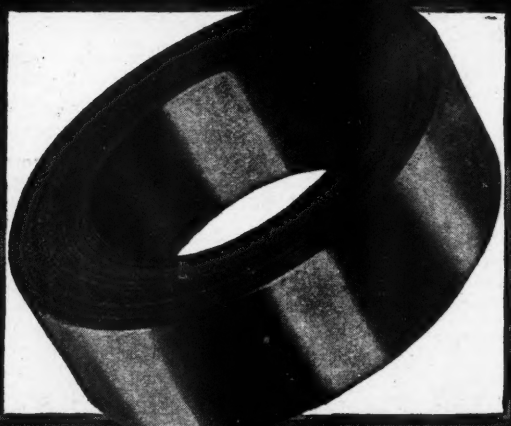

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No. 2059 Vol. LIII June 10th, 1948 Thursdays, One Shilling

The Outlook

Safer Flying

RECENT correspondence, and more particularly the article "Towards Greater Air Safety" which we published on May 20th, has served to focus attention on a subject which is causing disquiet throughout the world: the frequency of air accidents and the high percentage of them in which, there is reason to believe, the occupants could have been saved if the aircraft had not caught fire.

We have received from readers a large number of letters, some of which are published in this issue, in which the causes of accidents and fires in crashes are examined and solutions offered. As was to be expected, opinions vary greatly, and it is necessary to retain, among the wealth of detail, a clear appreciation of the fact that the whole subject divides naturally into two aspects: Causes which, directly or indirectly, lead to accidents; and how to prevent catastrophic fires from breaking out when an aircraft does crash.

The former is, unfortunately, not a matter for the aircraft designer. Numerous aids to navigation and flight control are in existence, most of them good; but the equipment is expensive, and no nation can well be expected to launch out into large commitments if, in a short time, international agreements might render the equipment redundant. Agreement is obviously necessary, since it would be impracticable to equip airports to cater for every possible system of airborne equipment. It would be equally impossible for an aircraft to carry all manner of "systems" so as to be able to work with a variety of ground installations on a route which traversed several countries.

I.C.A.O. is often accused of being too slow, of doing a lot of talking and arguing with little to show in actual practical results. To us this appears unfair in view of the many, and often conflicting, interests involved. But there is no denying the fact that the matter is urgent, and that until general agreement is reached on the type of equipment used on the main air routes of the world, accidents will continue to happen. Fortunately summer is just beginning, and a short breathing space is thus afforded us before autumn and winter, with their greater accident proneness, are upon us once more.

The Fire Risk

WHEN everything humanly possible has been done to avoid crashes, there still remains the problem of ensuring that when an accident does occur, the effect is less serious than, unfortunately, has been the case hitherto.

The letters which we publish this week, and others that will appear in the next issue, disclose considerable disagreement as to what should be done. That is not very surprising, in view of the number of different approaches which are possible, and some of which are impracticable for one reason or another.

One of the most obvious—and seemingly simple—ways of giving the occupants of a crashed aircraft a chance to get out of the machine is to increase the number and size of emergency exits. The problem is, however, not as simple as it appears. In the early days of civil aviation, when forced landings due to mechanical troubles or to weather were frequent, it was not difficult. Coverings were mainly fabric, and failing everything else a pocket knife could soon force an exit. With all-metal construction, sound-proofing of cabins and so forth, the problem has become rather more complicated. Frames of doors and hatch covers are apt to be distorted in a crash, and it does appear possible that a fair number of fabric-covered emergency exits might provide a workable temporary solution, at least in aircraft which do not have pressurized cabins.

The tendency in future aircraft will be towards high flying and pressurization, and what the answer to that puzzle may be we frankly do not know. It may be that there is none unless an unacceptable weight penalty is

to be incurred. Should that prove to be the case, the next step would appear to be that of preventing the outbreak of fire. It is unlikely that complete immunity can be achieved, and probably the most that could be hoped for would be a reduction of the amount of fuel scattered about, and a slowing-down of the rate of combustion.

So-called crash-proof tanks would reduce the rate at which fuel flowed out through broken pipe connections, but so long as highly volatile fuels are used, the ensuing conflagration will be of the sudden "woof" type. If that is to be avoided, a less volatile fuel will have to be used.

On May 6th we referred to an article on so-called "Safety Fuels" which we published in 1945. We have received a copy of a Paper written by representatives of the Standard Oil Development Company and presented to the annual meeting of the Society of Automotive Engineers at Detroit in January of this year. The Paper deals with results of work undertaken by that firm to determine the full-scale engine performance of such fuels. This work included tests of a number of fuels, both in a nine-cylinder Wright Cyclone and in the supercharged CFR single-cylinder engine.

The results appear to indicate that with fuel injection (the fuels cannot be carburetted in the ordinary way) there is a slight increase in specific consumption at cruising speed and at lean mixtures, but that at the higher operating temperatures there is little difference in consumption compared with the ordinary aircraft fuels. In the matter of bulk, however, the safety fuels are at an advantage.

With a warm engine the safety fuels were quite satisfactory in the way of idling, warming-up, acceleration and control. The test engines could not be started from cold on the low volatility fuels until cylinder-head temperatures of 125 deg F. had been reached, so that in actual use it would probably be necessary to start on ordinary fuel and switch over to the safety fuel when the engine was warm enough.

That appears to be the present picture of the safety-fuel position. It will be for the operators to decide whether or not any further development should be undertaken.

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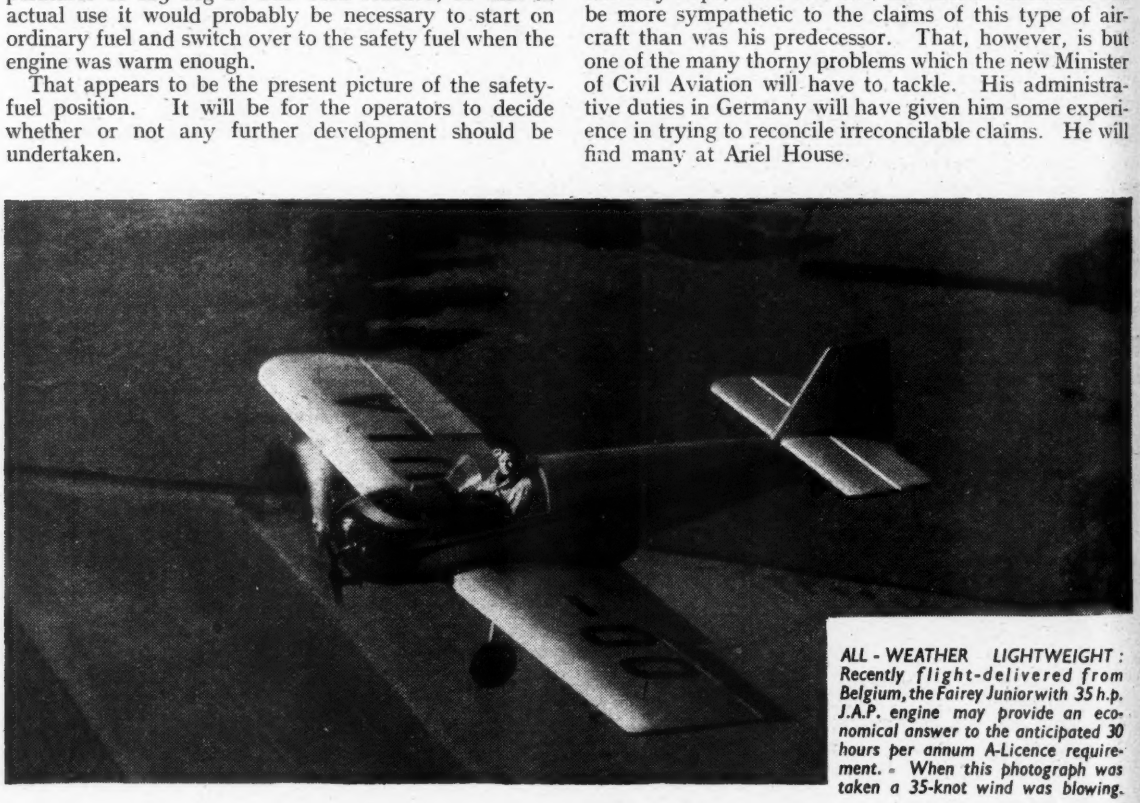
Forthcoming Events, page 648.

New Chief at Ariel House

LESS than two years ago we lamented the fact that a Government reshuffle had made it necessary to substitute Lord Nathan for Lord Winster in the Ministry of Civil Aviation. Now there is another change, and Lord Pakenham replaces Lord Nathan.

Lord Nathan has discharged an unenviable task with some credit. He had innumerable difficulties to face. And it can be said that he was always willing to listen to the views of all concerned. If, afterwards, he did not always act upon the advice given him, that may often have been due to the obtuseness of some of his colleagues in the Government, and to the imperviousness to persuasion of the Treasury.

Of his successor little is known in the aviation world except that he was chairman of the committee which examined possible sites for seaplane bases. Perhaps one may hope, from this fact, that Lord Pakenham will be more sympathetic to the claims of this type of aircraft than was his predecessor. That, however, is but one of the many thorny problems which the new Minister of Civil Aviation will have to tackle. His administrative duties in Germany will have given him some experience in trying to reconcile irreconcilable claims. He will find many at Ariel House.



ALL-WEATHER LIGHTWEIGHT: Recently flight-delivered from Belgium, the Fairey Junior with 35 h.p. J.A.P. engine may provide an economical answer to the anticipated 30 hours per annum A-Licence requirement. When this photograph was taken a 35-knot wind was blowing.

"JUNIOR" IN THE AIR

Fairey's Ultra-Light Design Handled in Rough Weather : Performance on 35 h.p.

By Wing Cdr. Maurice A. Smith, D.F.C.

IT was at the Brussels Show last summer that we were first able to examine and describe the prototype, Tips-designed, Fairey Junior, and to mention plans for the J.A.P.-engined version for this country. Now two of these attractive and intriguing little machines have been flight delivered to White Waltham, having flown from Belgium on virtually a cupful of petrol. The Junior has been tested and delivered by Mr. F. H. Dixon, who also ferried over one of the two now in this country.

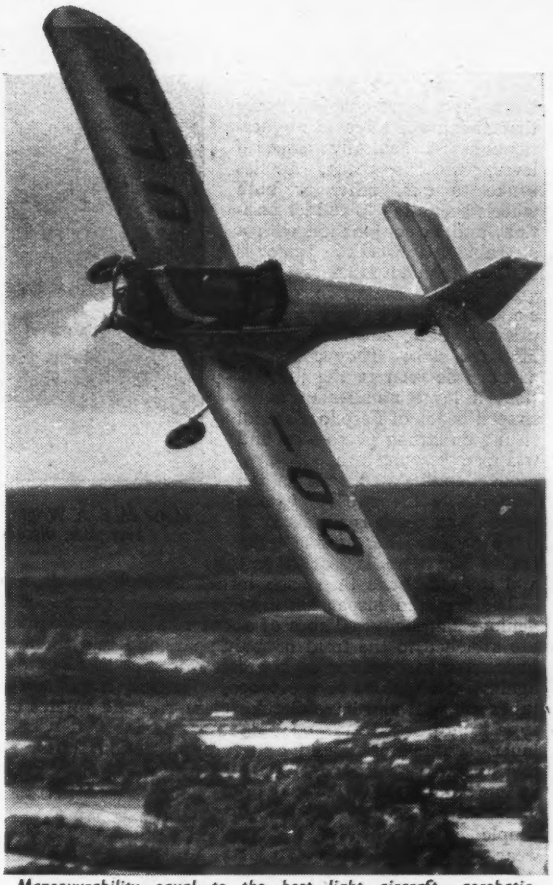
Briefly, the purpose of the Junior is to provide really economical flying in the lightweight class. With the anticipated 30-hour p.a. licence requirement in mind, the need for cheap solo flying has been mentioned frequently. This the Junior can provide, and from personal experience it can be stated that this is real powered flying, not motorized gliding. In spite of its diminutive proportions this little machine reproduces in every way the characteristics of a larger design, and it can be flown quite safely in rough weather.

Two-Cylinder Engine

The version which it is hoped will be produced for this country is the lower-powered one with 35-50 h.p. engine. Several dozen Aeronca J.A.P. horizontally opposed two-cylinder units are available, and it was one of these behind which I flew. The 62 h.p. Train-engined version naturally has better performance, but is of necessity a good deal more expensive to purchase, maintain and operate. This aircraft was illustrated and briefly described in a previous article in *Flight* of July 31st, 1947.

The Ultra Light Aircraft Association are naturally keenly interested in the Junior, and from them may come the lead for provision of alternative engines for when the available J.A.P.s are used up. My personal opinion is that an extra 10 h.p. would be desirable and an opposed twin giving 45 h.p. at not more than 3,000 r.p.m. would be ideal. For once an ideal is quite attainable as also is the requisite reliability and economy.

Construction of the Junior may be summed up in the word square. Wings, tailplane and control surfaces are square cut and, what is more important, all structure joints are at right angles, because experience has shown that they require less skill and time to produce and therefore are less expensive. Except for minor fittings, some fuselage formers and engine cowlings, the airframe is constructed entirely from 1-inch square-section spruce and small derivatives.

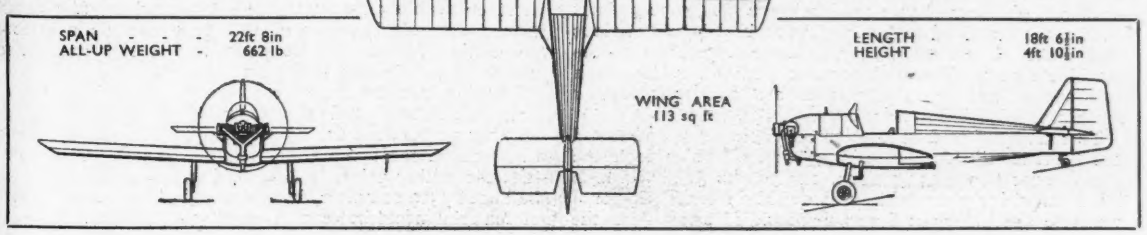


Manoeuvrability equal to the best light aircraft, aerobatic approval, and a lively performance are qualities of the ultra-light Fairey.

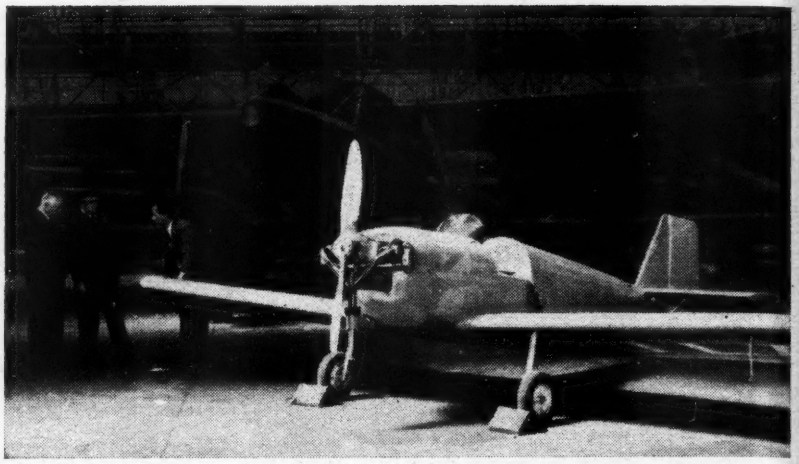
The mainplanes, of roughly rectangular shape, are built around a main front spar, which with the ply nose forms a torsion box, and a subsidiary rear spar. The wing is in one piece, passing through the base of the fuselage, and is bolted to the centre section. The front spar passes under the pilot's knees. The new up-bevelled wing tips are easier to produce and have unexpectedly brought about an improvement in aileron control.

A change from the orthodox is seen in the fuselage, which is built around two main longerons only. It has been described as resembling two ply-covered step-ladders tapering rearwards. Metal formers extend hoopwise over the longerons, and at the stern post the members are boxed for rigidity. The whole airframe is fabric-covered, and the finish is particularly good.

On a machine such as this, weighing only 430 lb, ounces must be watched, and therefore the provision of differential wheel brakes is an unexpected "complication" and luxury. These are of such simple design—some credit must go to Mr. Dixon as well as Messrs. Tips senior and junior, for



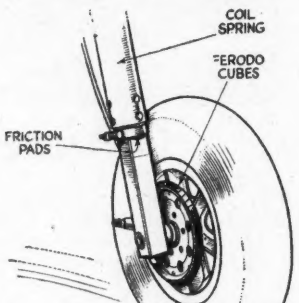
"Junior" in the Air . . .



Major M. E. A. Wright, Fairey director; A.V-M. Boothman, A.C.A.S., T.R.; and Mr. F. H. Dixon, test pilot, discuss the "Junior" before the A.V-M. took it up at White Waltham.

them—and operate so efficiently that the justification is unquestionable. A centrally disposed lever, without catch, applies brake to one, other or both wheels according to rudder position, and in conjunction with a steerable tail wheel the Junior is highly manœuvrable on the ground. The brakes themselves could be assembled by any enterprising young member of the Meccano club. They comprise, as may be seen in the illustration, a large number of cube-shaped beads of Ferodo material strung on strong piano wire and wrapped round a 90-deg. grooved pulley. A pull on the wire draws the cubes into the groove and there is a degree of servo action. To "reline" the brakes the wire is slacked off and the cubes are then each turned through 180 degrees.

The legs and suspension provide another example of ingenious simplicity. Tubes of about 1½in internal diameter are attached to the front or main spar, and into these are inserted square-section legs which react for landing loads against coil springs in the tubes. The lower ends of the tubes are split and have circular clamps of the Jubilee clip type to adjust pressure on Ferodo segments fitted between inner, square-section and outer, round-section tubes. In this manner variable spring damping is provided as well as a simple adjustment for wear. The Junior is very stable on the ground due to the short legs, and wide track of nearly 6ft.



The unusual but simple and efficient shock absorber leg and wheel brake.

Cockpit controls comprise the brake lever, already mentioned, an elastic elevator-loading device for trimming which is, however, hardly necessary, a petrol tap and choke both of motor-cycle pattern, ignition switches, and a throttle lever. Instruments provided on the panel are altimeter, A.S.I., r.p.m. indicator, oil gauge, and needle and ball. Above the petrol tank, between cockpit and engine, is a direct-float-type fuel capacity gauge, and on the cockpit floor between wing spars a P.4 compass which, perhaps because of its position, almost on the c.g., is one of the steadiest I have experienced on a light aircraft. Mr. Dixon confirmed this impression, adding that in the delivery flight across the Channel he was able to fly a more accurate course than he can remember on any previous occasion. The fuel tank holds eleven gallons and gives a safe duration of over four hours.

White Waltham was experiencing a gusty 30-35-knot wind when I arrived to fly the Junior, and it was obvious that I should not get a very accurate impression of the machine's capabilities and controls. However, to scotch any suggestion that lightweights are only fair-weather machines, I decided to have a go.

To start up, I pushed forward the choke lever and called out "Contact." A few swings, most of which took the engine over two compressions, started the J.A.P., which idled surprisingly smoothly and quickly warmed up for a magneto check. Next I was manhandled away from the hangar door, and then without difficulty taxied across wind to the edge of the tarmac. I turned into a W.S.W. wind and opened up. The Junior's tail was up in its own length and we were airborne in 30 to 40 yards. For those who know White Waltham, I opened up on the tarmac beside the control hut door, moving roughly parallel with the railway and hangars, and was airborne at about 20 feet over the curve of the grass in front of the old canteen.

Total take-off weight must have been about 600 lb, and it would be untrue to suggest that I knew much about the take-off in such gusty conditions. The controls gave immediate response, but were not embarrassingly sensitive, and in every way the Junior resembled a larger aircraft in behaviour. Climb is in the region of 450 ft/min (35 b.h.p. and 2,600 r.p.m.) and cruising speed at 2,400 r.p.m. is about 70 m.p.h. There is probably a considerable position error on the present A.S.I., which is not calibrated suitably and reads in k.p.h. A series of calibration runs are to be undertaken. The stalling speed is probably about 38 m.p.h. Wing loading is under 6 lb/sq ft.

After flying around the airfield for a few minutes, I set off to have a look at Ascot and surrounding country. Down wind the speed seemed terrific, across wind the drift was alarming and up wind speed appeared negligible.

Weather was unsuitable for aerobatics, although the little aircraft can cope on a calm day and the more powerful version is particularly pleasant for such manœuvres. The stall is straight and gentle, and recovery is immediate. Other points which I was able to note were that the turning circle is minute and that the effect of up and down currents is considerable. I made better time into wind by climbing every time I felt lift and using the height gained to give extra speed slightly downhill. The cockpit is warm and comfortable, and the view from it is exceptionally good.

For the landing I chose grass near the wind-sock and used plenty of engine. After some hovering a few feet up, and with a trickle of power, the Junior was persuaded to alight, and come to rest in a couple of lengths. Though almost lost in the grass it was possible to taxi across towards the hangars until retrieved.

The whole hour's flight, though somewhat lively, was a most enjoyable experience, and it proved beyond doubt that a tiny single-seater of this type can be a serious proposition for the private pilot, and a serviceable and useful aircraft in any reasonable weather.

Looking into the future and bearing in mind the popularity of dirt track and midget car racing, one can visualize exciting possibilities for closed-circuit pylon racing with a tiny manœuvrable aircraft such as the Junior. It is hoped that the selling price, if demand justifies production, will be about £500 complete, in wood, and a little more if lack of material necessitates part metal construction.

Farnborough Forecast

New Helicopters and Turbine-powered Transports on Show

THOUGH information concerning the types of aircraft participating in this year's S.B.A.C. Display at Farnborough (September 7th-12th) is as yet provisional and incomplete, it is certain that the occasion will once again reflect great credit on the Industry. True, some important classes of aircraft—jet-propelled bombers, for instance—will not be represented, but in other categories (helicopters and turbine-powered transport aircraft, to name but two) there should be some outstanding examples. The following brief survey of likely Farnborough "starters" is based on the best information available to date.

In the single-seat fighter class de Havillands will once again present the Vampire and Sea Hornet. The latest type of Gloster Meteor IV will perform and the new Nene-powered E.10/44 should have sufficient flying hours behind it to put up a show. At long last Hawker's will be permitted to display the N.7/46 Naval fighter (Nene) in addition to the Sea Fury, and the unique Saunders-Roe S.R/A.1 fighter flying-boat will show its paces. Vickers-Supermarine propose to have a Seafire 47 in addition to the Attacker. Miscellaneous military types will include an Avro Lincoln heavy bomber; Westland Wyvern, Blackburn S.28/43 and Firebrand V single-seat Naval strike machines; Bristol Brigand bomber; D.H. Mosquito; Handley-Page Hastings I heavy military transport; Scottish Aviation A.4/45 light military transport; Heston A.2/45 A.O.P., and Auster Mk VI A.O.P. Great technical interest will be aroused by the Supermarine Seagull, a Griffon-powered Naval amphibian with variable-incidence wing.

Military trainers will make an unusually strong showing. The Avro Athena and Boulton-Paul Balliol are both scheduled to appear in their turbine-powered forms—each with an Armstrong Siddeley Mamba. The D.H. Chipmunk and the Fairey Operational Trainer will represent extremes among the tandem-two-seater piston-engined trainers, and the Fairey Primer will make an interesting comparison with the more expensive Chipmunk. Gloster's, of course, will have the Mark VII Meteor Trainer and Percival's will present the latest development of the 2/3-seater Prentice. Once again the delightful Reid and Sigrist Desford, with two Gipsy Majors, is due to perform.

Among the civil transports an impressive display is expected from the Airspeed Ambassador, though greater novelty will be found in the A.W. Apollo (if ready in time) and Vickers Viscount medium airliners, each with four Armstrong Siddeley Mamba airscrew turbines. Avro's will present a representative mark of Tudor, and Handley-Page are hoping to have the first of the Hermes IVs, with nose-wheel undercarriage. The Bristol Freighter/Wayfarer is a hardy annual which never fails to impress. Some low passes by the Short Solent will enable our visitors to study the latest type of flying-boat in commercial service, and a Vickers Viking will represent a well-established type which has a counterpart in the Valetta military transport, likewise to be shown. The Avro Tudor VIII, with four Rolls-Royce Nenes, and the special Vickers Viking with two Nenes should both be ready to make their debut, but these models, of course, are strictly research machines. The Airspeed Consul, D.H. Dove, Percival Prince and Merganser, Portsmouth Aerocar and Short Sealand amphibian will illustrate what British manufacturers can offer in the light transport category. Private-owner and charter types will include the Auster Avis and Autocrat, Chrislea Super Ace, Newbury Eon, Percival Proctor seaplane and Planet Satellite.

The immense advances lately achieved in this country in the development of helicopters will be typified by the Bristol Type 171; Cierva W.11 Air Horse (passenger/cargo helicopter with a single Merlin); Cierva W.14 Skeeter (a two-seater with a flat four engine); and the 4-seater Fairey Gyrodyne.

Whereas the Tudor VIII and Nene-Viking may be classed as "research airliners," the tailless A.W.52 (two Nenes) and the D.H.108 (both to be demonstrated) are specialized types for aerodynamic research. The Theseus-Lincoln and Ghost-Lancastrian are best described as flying test beds.

Glider manufacturers have plans for a really impressive demonstration. Elliots of Newbury will present the Olympia Eon sailplane, Primary Eon glider and Baby Eon glider; Martin-Hearn will be represented by the Kirby Kite II and Kirby Tutor; Short's by the Nimbus; and Slingsby by the Kirby Gull IV and Type 21. The five last-named types are sailplanes. Gliders, incidentally, will be demonstrated on the morning of Thursday, September 9th. The public will be admitted on September 11th and on the afternoon of the 12th.

Belgian Helicopter Display

ON May 29th and 30th the Comité National D'Aéronautique and the Royal Aéro Club of Belgium gave a small air display entitled "From Balloons to Helicopters" at the Centenaire Stadium at Heysel, just outside Brussels.

The display opened when four large balloons, each carrying a precarious basket-full of intrepid balloonists and their families, cast off and ascended rapidly beyond the view of the spectators through the low stratus of rain cloud that deluged the crowd from the word go.

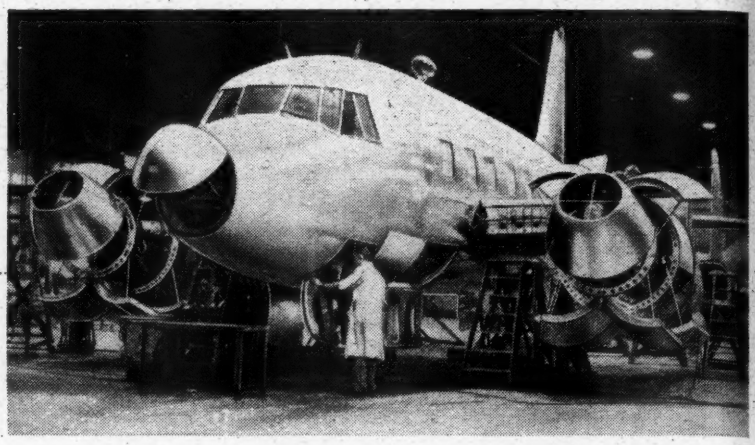
The most important part of the display was obviously the event which featured the helicopters, and this side was looked after most admirably by Mr. Alan Bristow flying the Westland-Sikorsky, and Mr. H. Bulten who flew another S.51 which belonged to the Dutch company Frits Diepen Vliegtuigen of Ypenberg. Alan Bristow gave a distinguished, if somewhat hair-raising, display of heliobatics as he weaved a rapid pattern in and out of the high flag poles and lamp standards that surrounded the arena. All the manœuvres that we have now become accustomed to expect from helicopters were displayed, and there was one amusing occasion when a mechanic, who had graciously volunteered to be "rescued" from a dinghy in the middle of the field, mistook his identity when he failed to grab the cable dropped to him and started walking out across the "sea" to grasp it!

The Westland-Sikorsky had been flown across in order to be demonstrated at Brussels and on several other occasions at Antwerp. The outward flight from Lympne was made with a Belgian lady pilot, Mrs. Anne Good in the front seat; this was therefore the first occasion that a woman has crossed the channel in a helicopter, and it was, indeed, only the second west to east crossing to be made.

Mr. Alan Bristow made the return trip through extremely bad weather and one of his passengers, Mr. Colin Cooper, who had been representing the Helicopter Association of Great Britain in Brussels, could not speak too highly of the skill displayed by the pilot during the extremely rough two-hour flight from Antwerp. At times over the sea the machine was forced to within a few feet of the waves in order to obtain a view of the horizon.

Alan Bristow performing his famous "parking" act at Brussels.

HERE AND THERE



PURE-JET TRANSPORT : The Vickers Nene-Viking, which already has several hours' flying behind it, is seen under construction at Wisley. This machine—a development of the standard 24-passenger version—has twin-wheel main undercarriage units. It is intended solely for research.

Canadair-Four Perhaps

ALTHOUGH both the Ministry of Civil Aviation and B.O.A.C. refused comment, it was reported from a source quoting the Department of Trade and Commerce, Ottawa, at the time of going to press, that final details of a contract to supply B.O.A.C. with Canadair-Fours were being worked out.

Meteor IV Displayed at Bordeaux

AT the French Air Force Display at Bordeaux on Sunday, June 6th, a Gloster Meteor Mark IV was flown by Rodney Dryland, the Gloster test pilot. The Meteor will be on show at the Bordeaux Exhibition from June 13th to 27th.

Lumberjacks

TWENTY ex-R.A.F. officers and airmen have almost completed a two-year course in forestry at Huntley Manor, Gloucestershire. Six of the men obtained posts as foresters on estates throughout the country after only 18 months' training, and three others have been promised good jobs as soon as housing accommodation is ready. This has been one of a series of courses financed with money given to the R.A.F. Benevolent Fund by Mr. Charles P. Ackers, a leading forestry expert, in memory of his son (a fighter-pilot killed in action in Normandy) and administered by the Resettlement department of the Air Ministry.

Cloud Height Measurement

A MERCURY arc projector, used in conjunction with a photo cell pick-up unit, has been introduced by the U.S. Weather Bureau for measuring the height of clouds and rain ceilings up to a height of 20,000 feet. An intense beam of modulated light is directed against the cloud, the spot formed on the base of the cloud being detected by the pick-up unit. The height is then determined automatically by triangulation.

Hawker Appointments

MR. T. D. M. ROBERTSON has been appointed general manager of Hawker Aircraft, Ltd., and Mr. J. T. Lidbury has been appointed secretary. Mr. Robertson joined the company as chief accountant in 1934 and became assistant secretary in 1941. He became secretary in 1942 and was elected to the board in 1946. Mr. Ridbury has been connected with Hawkers since 1938; in 1942 he became personnel manager and coupled with this position that of assistant secretary.

"You Can't Laugh It Off"

NOW that Bill ("Raff") Hooper has issued his new work, entitled as above, the study and cultivation of the moustache can hardly fail to flourish anew. This scholarly work, which treats of the forms and history of facial flora, is obtainable—price 2s—from the Windsor Press, Trading Estate, Slough, Bucks.

Peace-making Dakota

A SPECIAL K.L.M. Dakota has been chartered for the use of Count Folke Bernadotte, the mediator in the present Palestine conflict. This aircraft is painted white and bears the Red Cross markings and the words United Nations; it is to be commanded by Commander A. Viruly, senior pilot of K.L.M., and will carry Count Bernadotte and his staff of 15 on their visits to all countries in the Near East.

Edinburgh Air Display

A DISPLAY of aerobatics, formation take-offs, simulated attacks on the airfield and interception by fighters will be put on by units of Reserve Command at Turnhouse airfield on June 12th. Activities will range to a height of 10,000ft and occupy a radius of eight nautical miles, and pilots not concerned with the display or not on scheduled flights to Turnhouse are advised to avoid flying in this area between the hours of 1300 and 1630 G.M.T.

High-speed Production

DURING the T.T. races in the Isle of Man on June 7th, 9th and 11th, *The Motor Cycle*, one of the Associated Iliffe group of publications, is working to a special high-speed schedule to bring out its June 10th issue two days before nominal publication date. Photographs and reports of the first day's racing were flown from the Island to London by specially chartered aircraft and the complete issue, with a full, illustrated commentary on the race, prepared overnight at Dorset House. On Tuesday, June 8th, the Cornwall Press having completed their work, copies were flown back to the Island so as to be available on the course soon after lunch, less than 24 hours after the actual race. A second issue, dated June 17th, will provide a complete record of all the remaining races.

College of Aeronautics Syllabus Extended

THE Board of Governors of the College of Aeronautics has, after careful investigation of the problem of teaching those aspects of aeronautics not covered by the existing courses, instituted a Chair of Aircraft Economics and Production. It is proposed that all students shall have the opportunity of obtaining instruction in the organization, administration, manufacture and production design of aircraft and engines. In addition to thus widening the syllabus, facilities for advanced specialization in this field are to be provided. The first of the new courses will start, if possible, at the beginning of the new term in October.

Flying Wing Crash

IT has been reported from America that a Northrop YB-49 crashed while on a test flight at Muroc Field, California. The crew of five lost their lives. The YB-49 is an eight-jet bomber of the "flying wing" type and has an all-up weight of between 90 and 100 tons.

Russian Rewards

A NUMBER of Russian aircraft designers have recently been awarded Stalin prizes for their work. Alexander Yakovlev, designer of the Yak fighter, gained a first class Stalin award for the sixth time for a new type of military aircraft, doubtless the single-jet fighter now in service. The two Russians jointly responsible for the Mig-1 and Mig-3 fighters have been awarded first class prizes for the second year in succession. They too have designed a jet fighter. The designers of the La-5 fighter and the TB-7 bomber have also received first class prizes. A Stalin award, first class, amounts to 150,000 roubles, or about £7,000.

U.S. Gas Turbine Approved by C.A.A.

THE model 400-C-4 gas turbine produced by the Allison engine division of General Motors has been approved by the American Civil Aeronautics Administration for commercial transport aircraft; it is the first U.S. jet to receive this approval. This engine has been used

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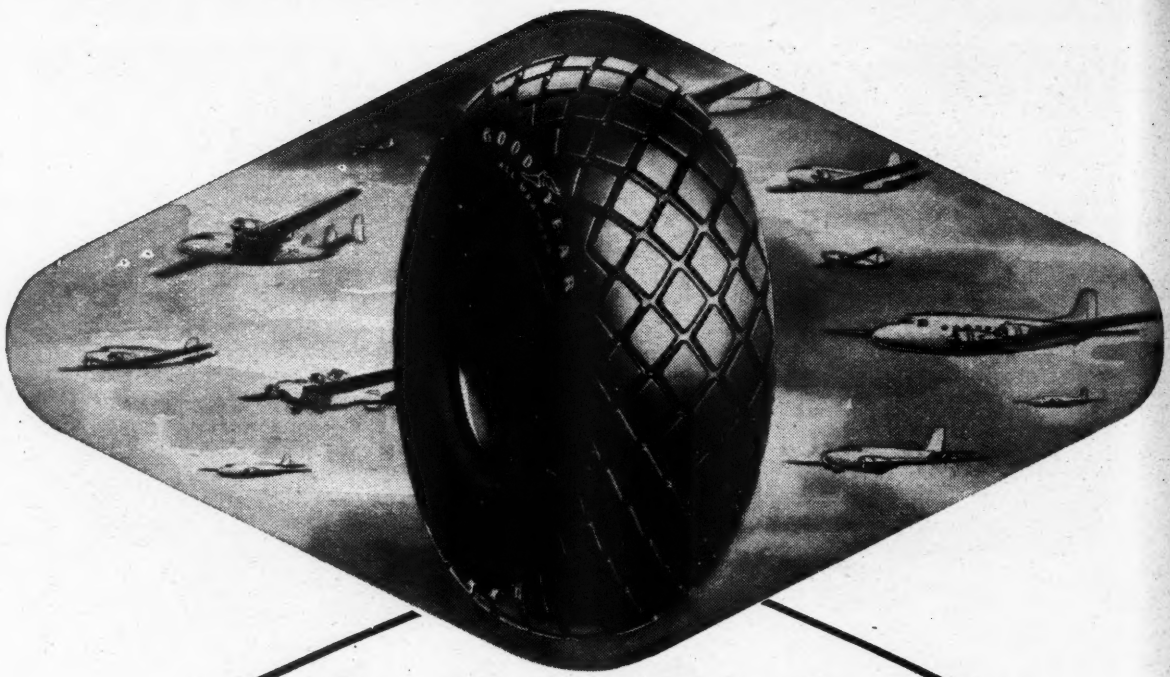

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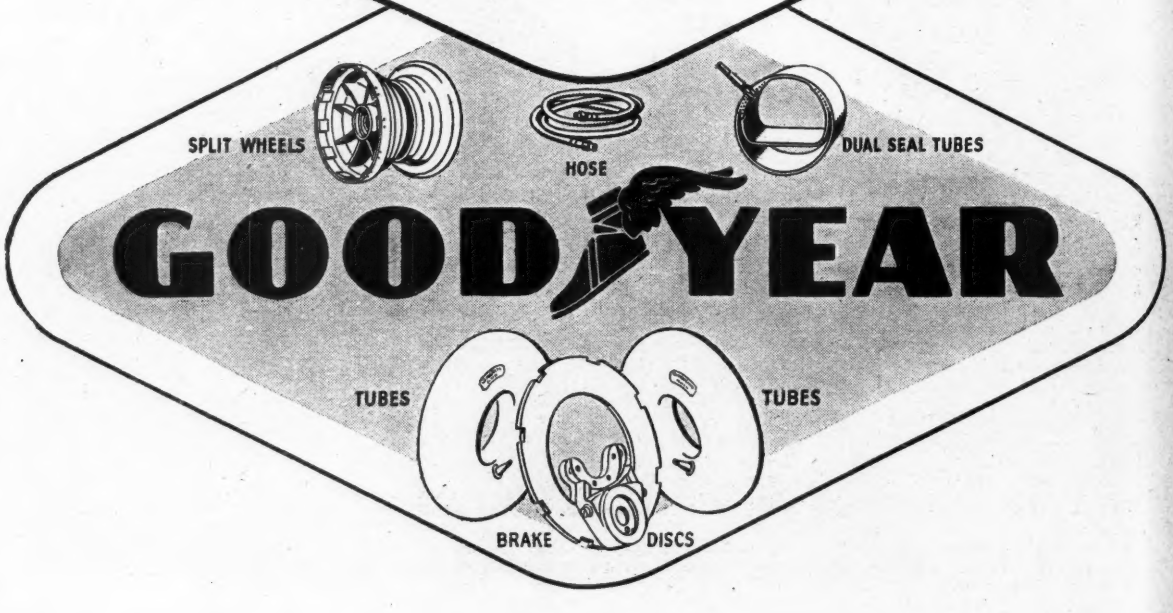
For fuller information write to the Aviation Products Department, Goodyear, Wolverhampton.



HERE AND THERE

in the Lockheed Shooting Star and also powers the new U.S. Navy Grumman F-9-F Panther.

Air Travel to Canada

ON June 1st Trans-Canada Air Lines began two services a day with pressurized "North Star" aircraft across Canada stopping at Montreal, Toronto, Winnipeg, Calgary and Vancouver. A two-return flights daily service between London and Montreal started on the same day and the Lord Mayor of London sent a message of greetings to the mayors of each of the Canadian cities to be brought into this new service.

Emigrant Ferry Pilots

MANY aircraft for sale overseas are being flown to their destinations by pilots who are emigrating from this country to the Dominions or Colonies. In the last few weeks W. S. Shackleton, Ltd., have delivered two Proctor Vs, an Auster and an Autocrat, a Fairchild and a D.H. Rapide to Africa, the Malay States and Malta in this way. It is found that it is cheaper than delivery by sea owing to the high charges for packing and shipping space.

S.L.A.E. in Singapore

ALTHOUGH handicapped by not having its own premises, the Singapore branch of the Society of Licensed Aircraft Engineers held a number of meetings during May. Mr. J. Dennis gave an interesting lecture on "Jets and Gas Turbines," and a talk on aviation fuels was given by Mr. E. A. Crabbe, a technical officer from the Shell Company. A film show, including films on hydraulics and airscrews, was also put on, by courtesy of the Shell Co., Ltd.

Ex-Service Freighters

UNDER a recent offer to make wartime freight aircraft available to established airline companies in America the U.S. Air Force has leased 74 C-46 transports to 17 different air lines; applications from 27 other companies are under consideration but as the number of aircraft available is understood to be limited to 75 machines it is doubtful if these companies will be successful in obtaining any. Pan American may use these on its South American services.

HISTORICAL HILL: The artificial hill at Lichterfelde, near Berlin, from which Lilienthal made his first successful glides. A model of his glider is decorated with wreaths following the centenary celebration on May 23rd.

Lilienthal Centenary

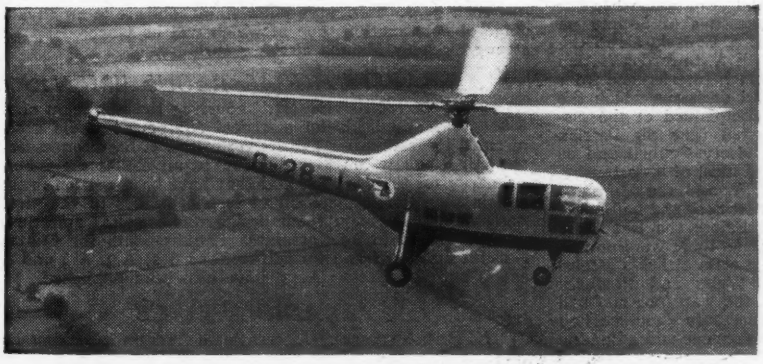
MAY 23rd was the 100th anniversary of the birth of Otto Lilienthal, one of the greatest pioneers of gliding flight and one of the principal contributors to the knowledge and confidence which subsequently made mechanical flight possible. A native of Germany, Lilienthal devoted a major portion of his time to the study of the flight of birds and in 1893 made his first successful flights in a glider weighing about 44 pounds and having a total area of 150 sq. ft. In August, 1896, he met with a serious accident, while experimenting with a rudder operated by a line attached to his head, and died from his injuries.

Economy

TWO of the new Fairey Junior single-seat light aircraft, which have an all-up weight of about 500 lb, on May 28th made a 65 minute cross-Channel flight from Ostend to Folkestone; one was piloted by Mr. F. H. Dixon, Fairey's test pilot. Each aircraft used about one and a half gallons of petrol and it is thought that this was the cheapest flight ever made from Belgium to Britain.

Nice Timing

A NEW ZEALAND airman, Mr. J. S. Blacmore, recently flew over the volcano Mount Ruapehu taking photographs, and just after he had left the vicinity of the crater the volcano erupted without warning, sending stones and lava to a height of 5,000 feet. As he had spent some while circling at 100 feet, Mr. Blacmore considers himself extraordinarily lucky.



B.E.A. EXPERIMENTAL MARKINGS: This Westland Sikorsky helicopter puzzled the photographer by its unusual markings. G-28-1 is a number allocated to B.E.A. for this as yet unregistered aircraft which has been used for experimental and test flights.

News in Brief

During its recent demonstration tour in Australia the H. P. Hastings was damaged by thieves, who stole valuable equipment and wrecked the interior.

* * *

Boulton Paul Aircraft, Ltd., have appointed Mr. S. C. Redshaw, chief engineer, and Mr. G. C. Haynes, secretary, to be directors of the company.

* * *

Mrs. R. Brown, of Burnie, Tasmania, made her first flight recently to celebrate her 94th birthday. Australian National Airways donated Mrs. Brown a free return trip from Melbourne to her home-town as a birthday present.

* * *

A cynical B.E.A. pilot recently remarked that the Ambassador was an excellent aircraft, and he could only hope that it was sufficiently excellent to carry the weight of Keyline House on its back.

* * *

The London representative of Armstrong Siddeley Motors, Ltd., Mr. D. M. Lambert, has moved from 70, Pall Mall, London, S.W.1, to 18, St. James's Square, S.W.1.

* * *

The Argentine Secretary for Air, Commodore B. de la Colina, is expected to visit the U.S.A. and countries in Europe shortly to study problems in connection with the development of aviation in the Argentine.

* * *

The Royal Canadian Air Force Benevolent Fund has increased its balance to $3,191,633 during 1947. Grants last year to 1,782 applicants amounted to $195,299, and contributions totalled $186,690.

* * *

A composite Naval squadron comprising two Sea Furies, two Sea Hornets and one Sea Vampire, will perform near New York between July 31st and August 8th. The R.A.F. will be represented by six Vampires of No. 54 Squadron.

CIVIL AVIATION NEWS

GUARD OF HONOUR: Emir Feisal of Saudi Arabia arriving on June 1st at London Airport on a normal B.O.A.C. service from New York. The Sixth Airborne Division formed a Guard of Honour. The Constellation Bedford G-AKCE is the aircraft bought privately by B.O.A.C. about six months ago, and which came into service last month.

International Aeradio Manuals : Details of American Airline Finances : Tudor Crash Report

NEW MINISTER

LORD PAKENHAM has been appointed to the post of Minister of Civil Aviation in succession to Lord Nathan, who is resigning in order to return to his practice as a solicitor. Lord Pakenham, who is 44, was chairman of the Marine Bases Committee and as such had the opportunity of studying closely some aspects of civil aviation. This is the second occasion that he has succeeded Lord Nathan, the first being in 1946 when he became Under-Secretary of State for War. Since April 17th, 1947, Lord Pakenham has been Chancellor of the Duchy of Lancaster.

Lord Pakenham.

SCOTTISH GRIEVANCES

A DEBATE on civil aviation in Scotland developed when the House of Commons went into Committee of Supply on the Civil Estimates on May 31st. Mr. J. S. C. Reid asked the Minister to intervene in the attitude of B.E.A. towards aviation in Scotland. There was, he said, too much interference from the South and there had been misguided decisions which the Corporation had since admitted. He complained of the dismissal of Captain Fresson, and suggested that Sir Patrick Dollan as chairman of the Scottish Advisory Council and as a member of the Board of B.E.A. devoted most of his attention to active propaganda on behalf of B.E.A. and the Ministry. In reply Mr. Lindgren set out to prove that Scotland had never been better served than it was now. Before the war there were only three municipal airfields, whereas there were now in Scotland, as a result of the war, 14 first-class airfields receiving scheduled services; and England, Wales and Northern Ireland had only eight airfields. Since the war £604,000 had been spent on airfields in Scotland, while only £300,000 had been spent on airfields in the United Kingdom excluding London Airport. Scotland's route mileage at present was 2,083, whereas on internal services in the rest of the U.K. mileage amounted to only 1,704. The weekly frequency of services in Scotland was 184, whereas, including services to holiday resorts, such as the Channel Islands, the rest of the U.K. area had a weekly frequency of services amounting to 366. For the period between January 1st and August 31st, 1939, 10,865 passengers were carried in Scotland with a capacity of 354,791 ton-miles. In 1946 under the A.A.J.C., on services provided between April of that year and the end of January, 1947, 29,134 passengers were carried with a capacity of 531,500 ton-miles. For the year 1947-48 B.E.A. had carried 114,826 passengers and the ton-mileage had amounted to 3,573,300. There were suggestions that the Advisory Council was not acting in its proper capacity and that B.E.A. were not encouraging people of Scotland to fly on internal services.

MARATHON CRASH

THE only information so far available about the prototype Marathon which crashed on May 28th is that it was flying on normal development trials from Boscombe Down. Mr. Brian Bastable, the Ministry of Supply pilot at Boscombe Down, and Miss Beryl Edmunds, one of the women observers, lost their lives. Two more Miles Marathons are in an advanced stage of construction, one of which will be powered by Armstrong Siddeley Mamba airscrew turbines.

A.R.B. ELECTRICAL REQUIREMENTS

A NEW bound Section "J," covering the minimum acceptable standards for electrical equipment to be used in aircraft, its installation and its performance, has been issued by the Air Registration Board. The requirements are intended primarily for the designer, and they have been written in terms which allow for segregation of responsibilities of the aircraft designer and the equipment designer. Loose-leaf amendments and additions to Airworthiness Requirements for Contents, General foreword, and for sub-sections A.1, A.3, A.4 and A.5, and a new sub-section A.43, have also been published.

AERADIO SERVICE

THE British company International Aeradio is making available a new service to aviation which will be known as AERAD. The service will consist of the publication of route manuals following the form used in airlines for routes over most of the world. Manuals will be available for areas or routes

SAFETY

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"**SAFETY** *must be the predominant note in civil aviation . . .*" *Lord Nathan*

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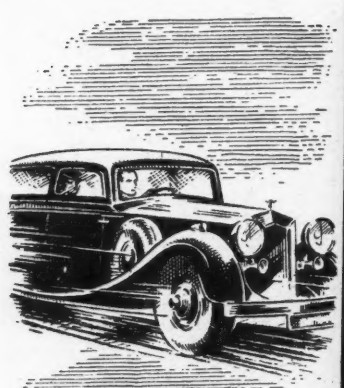

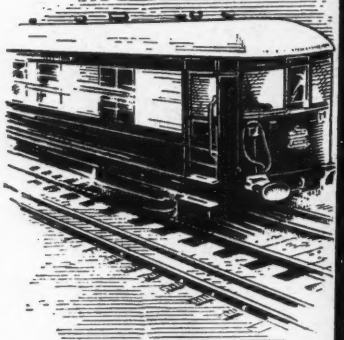

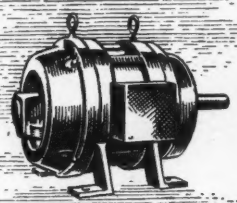

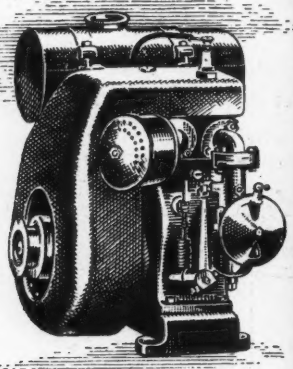

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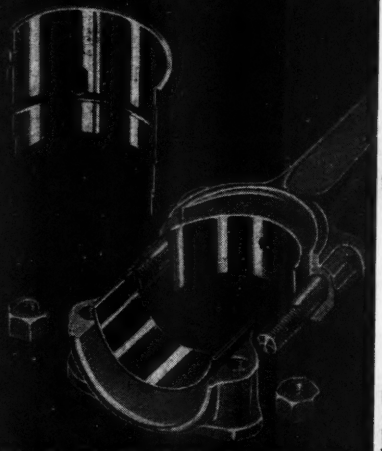

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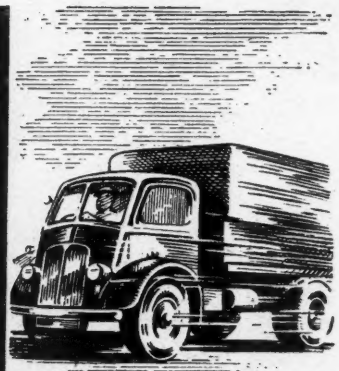

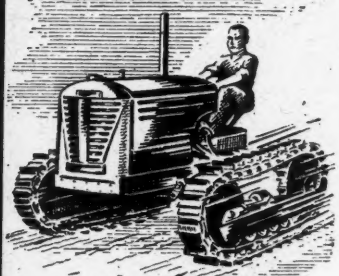

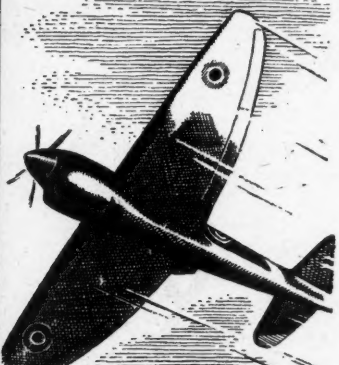

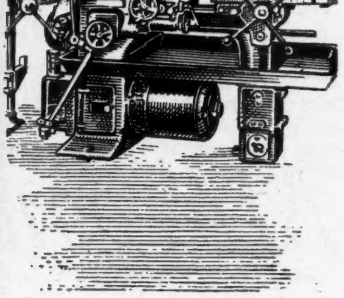

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according to individual requirements, and a charge of £5 will be made for each. An amendment service for keeping all manuals up-to-date will be available at the rate of £5 a quarter, on a route such as that between the U.K. and South Africa. International Aeradio are also installing a briefing organization overseas at the request of foreign governments, in conjunction with operating airlines. Two officers are already operating at Castel Benito. In addition, the company is willing to undertake the printing of charts and maps under technical supervision. In charge of development is Mr. John Foot, who was responsible for the Route, Airfields and Navigational Aids Document of the R.A.F., and later the B.E.A. Navigational Aids Directory.

NEW B.A.L.P.A. CHAIRMAN

OWING to his increasing responsibilities as chief pilot of British European Airways, Capt. J. W. G. James has resigned from the chairmanship of the British Air Line Pilots' Association. Capt. James joined the Association in 1937 and became joint chairman with Capt. G. B. Musson in 1941, but when the latter was lost in the flying boat *Clare* in September, 1942, Capt. James assumed full responsibility and has held office since that time. The Control board has elected Capt. James a honorary life member of the Association. Capt. A. P. W. Cane has been elected the new chairman. He is a senior pilot with over 9,000 hours, and is at present B.O.A.C. flight captain at Hurn. He has been a member of B.A.L.P.A. since 1941.

HELICOPTER SERVICE

FOLLOWING the success of their experiments in the carriage of "dummy" mails by helicopter in Somerset and Dorset earlier this year, B.E.A. in conjunction with the G.P.O. have extended the scope of their operations to cover the regular carriage of "live" mail. The new helicopter mail service opened on June 1st, as reported briefly in *Flight* last week. The service, commencing from Peterborough at 09.55 hours, is scheduled to arrive at Great Yarmouth at 12.49 hours, calling at eight stations *en route*. Time allowed at each station for the loading and unloading of mails is 40 seconds, except at Norwich, where there is a 5-minute interval for refuelling. The return journey departing from Great Yarmouth at 17.35 hours arrives at Peterborough at 19.30 hours, calling at Lowestoft, Beccles, Norwich and Dereham *en route*, with again a 5-minute halt at Norwich for refuelling. Scheduled time for the outward route covering 170 miles is 2 hours 54 minutes; the return to Peterborough, a distance of 102 miles, is scheduled to take 1 hr 55 minutes. On Saturdays the service operates between Peterborough and Norwich only, the outward journey departing at 07.25 hours and arriving at 08.30 hours and returning to Peterborough at 09.45 hours after a 10-minute halt at Norwich. There will be no mail service on Sundays.

It is stressed that the helicopter mail service is still in the nature of an experiment, and the service in the Peterborough and Norfolk areas is to be used primarily to obtain information with regard to costs of transport of mail and the reliability of such transport under actual working conditions. About 4,000 letters are expected to be carried daily, and it is hoped to demonstrate that a fixed schedule can be regularly maintained with a high degree of punctuality.

AMERICAN AIRLINES' LOSSES

FURTHER details of the $20,900,102 loss incurred by the 16 domestic trunk airlines in the United States announced in *Flight*, May 27th, have now been made available. These show that revenue miles flown during the year amounted to 311,879,430, as against 304,544,012 during the previous year. Of the operating revenue, passenger revenue rose from $272,573,483 in 1946 to $303,193,782 in 1947; mail revenue from $9,880,164 to $23,325,630; express revenue from $9,185,338 to $10,530,408; freight revenue from $4,084,575 to $8,357,837; and all other revenue came to $7,082,710 as against $5,776,089 the previous year. The total revenue thus earned amounted to $352,490,367, an increase over the previous year's total of $311,499,649, but operating expenses totalled $317,121,481 and $373,390,469 for 1946 and 1947 respectively, which accounted for the net operating losses in both these years.

U.S. mail ton-miles flown by American domestic trunk airlines during February this year decreased by 0.53 per cent, freight ton-miles increased 124.26 per cent, and express ton-miles increased 7.21 per cent, over the corresponding period in 1947. Revenue miles flown decreased 6.81 per cent, and the number of revenue passenger miles decreased 4.91 per cent in February, 1948, as compared with February, 1947. Statistics for February, 1948, show that revenue miles flown decreased from 22,512,039 to 20,978,362, revenue passenger miles decreased from 368,017,000 to 349,934,000, U.S. mail ton-miles decreased from 2,631,839 to 2,617,964, express ton-miles increased from 2,035,478 to 2,182,140, and freight ton-miles increased from 1,791,075 to 4,016,648. The revenue passenger load factor for February, 1948, was 55.94, as against 58.93 for the corresponding period last year.

DE HAVILLAND AIRCRAFT SPARES

THE de Havilland Aircraft Company will continue the manufacture of Dragon Rapide spares to the end of 1951 and the manufacture of Tiger Moth spares until the end of 1949, although those types of aircraft are no longer in production. Since orders for Tiger Moth spares should reach the company by the end of this year, and by the middle of 1950 for the Dragon Rapide, operators of both types are advised to review their spares position in order that good stocks of those parts in particular demand can be assured before production ceases. There may be some delay in supplying certain spares should stocks become temporarily exhausted, but it is hoped that no serous inconvenience will be caused. Small stocks of some Leopard Moth parts also exist.

TUDOR II PROTOTYPE CRASH REPORT

THE official report of the Chief Inspector of Accidents on the accident to the first prototype Tudor II, in which Mr. Roy Chadwick, C.B.E., Mr. S. A. Thorn, and two other members of the Avro staff lost their lives last August, has recently been published. The accident, it will be remembered, occurred just after the Tudor had taken off from Woodford airfield for a test flight to investigate the effects of alterations to the tailplane. The flight engineer, Mr. E. Talbot, who survived his injuries, stated that after the aircraft had become airborne he looked at Mr. Thorn and saw that he had the control spectacles hard over to port as though trying to raise the starboard wing. It was established that after leaving the runway the starboard wing dropped and the tip hit the ground; the aircraft then continued for a distance of 300 yards before coming to rest, completely wrecked, with its nose in a pond surrounded by trees.

Examination of the wreckage at first led to a belief that a

SUMMER EXPERIMENT: Postmen loading a B.E.A. helicopter from the waiting mail van at Peterborough. The method knocks about 12 hours off delivery time in the area. Experiments will continue for 3 or 4 months during the summer period.

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flap-operating rod failure had led to the accident, but subsequent R.A.E. examination of the rivet failures in the flap-operating tube indicated that they were not primary but were the result of impact forces. Further investigation by the Avro design office revealed that it was possible to assemble the aileron controls incorrectly so as to reverse their effect; according to design requirements this should be mechanically impossible. When the control columns were inspected it was found that the aileron-operating chains had in fact been attached to the wrong operating cables during modifications, carried out since the previous flight, thus reversing the operating sense of the ailerons. Both first and second pilots' controls had been incorrectly assembled; had only one been incorrect the defect would have stood more chance of detection, as the two spectacles would not have moved in harmony. The work was cleared by two of the firm's inspectors who were quite definite that they both carried out a sense check and that the ailerons were functioning correctly. The control system had not been submitted to A.I.D. inspection since the inspector who signed the certificate of safety—form 1090—was under the impression that the work carried out did not constitute a substantial alteration, and he was, therefore, within his authority in issuing form 1090.

In his conclusions the Chief Inspector of Accidents states that the aileron controls were assembled in such a manner as to operate in the reverse sense to normal control wheel movements; also that the aileron control circuit did not fulfil design requirements. Moreover, the issuing of form 1090 by a member of the firm's inspection staff was irregular. In his opinion the accident was the result of the pilot being unable to maintain lateral control after take-off due to this incorrect assembly of the aileron control circuit.

TWO OLD-TIMERS: Captain E. W. Jordan, one of the most experienced pilots on the Channel Islands service and now B.E.A. Flight captain, Jersey, visited Christchurch recently in a Rapide to inspect the Ambassador with Mr. G. O. Waters, B.E.A. general manager, and Mr. J. M. Keene-Miller, area manager, C.I.

BREVITIES

Negotiations for an air agreement between the United Kingdom and Pakistan were due to begin in Karachi on June 1st.

* * *

Mr. N. C. Ghosh, Director-General of Civil Aviation in India, whilst in England on his way to the I.C.A.O. meeting in Geneva, attended the Commonwealth Air Transport Council discussions, visited Air Service Training Limited at Southampton, where he met some of the Indian students, and Airways Training Limited at Aldermaston, where he discussed the question of Indian instructors being sent to the company for training. After visiting various English manufacturers he expressed enthusiasm for the Airspeed Ambassador and the Percival Prince.

Mr. N. C. Ghosh.

* * *

Dr. George Pierce Baker, Professor of Transportation at Harvard University, will read the annual I.A.T.A. Paper at the fourth general meeting of the Association at Brussels on September 16th. The subject will be "Looking Ahead in International Air Transport." Dr. Baker was Director of the Office of Transport and Communications Policy of the U.S. Department of State and has served as vice-chairman of the U.S. Civil Aeronautics Board.

* * *

A series of charter flights to the main capitals of Europe to bring immigrants to Australia is being run by Australian National Airways. The first to Rome was completed, with 40 passengers, on May 7th, under charter to the Orient Lloyd Travel Service.

* * *

A.N.A., up to the time it handed over the Pacific service to B.C.P.A., completed a total of 255 flights, including 53 from New Zealand. During this period 2,226,000 miles were flown in 11,130 hours, and 7000 passengers, 80,940 lb of mail and 121,000 lb of freight were carried. All flights, with one exception, were completed on schedule, the exception being a few hours' delay at Fiji for engine adjustments.

* * *

D.N.L. operational statistics reveal that during March a total of 4,874 passengers was carried, of whom 414 were on domestic routes, 4,399 on foreign routes, and 61 on non-scheduled services. Freight carried totalled 44,110 kilos, of which 1,701 were flown on domestic routes, 25,914 on foreign routes, and 16,495 on non-scheduled flights; and mail carried on domestic, foreign and non-scheduled flights totalled 18,254 kilos. During the month 328,336 kilometres were flown.

* * *

Now that Aer Lingus have replaced their 58-seater Constellations by 21-seater Douglas Dakotas, the Irish company are operating increased frequencies on the Dublin-London route. There are 10 flights daily on the route, offering a passenger capacity of 420 as against 464 previously. Later in the summer 12 daily flights seating 508 passengers will operate. There have also been alterations in the services to Liverpool and Glasgow, and the Dublin-Brussels service has been suspended, although the reciprocal service by Sabena continues. The company's aircraft now land at Northolt, instead of at London Airport as formerly.

* * *

C.S.A., the Czechoslovakian airline, celebrated its 25th anniversary on May 28th by holding a luncheon party in London, at which representatives from 33 foreign airlines attended. During 1947 this airline flew 6,000,000 kilos of freight and over 15,000 passengers, and claims that during the last eighteen months of operation there has not been a single accident. A 100 per cent regularity record is also claimed. The company operates 52 Douglas freight and passenger aircraft on routes to 19 countries, and hopes to fly Constellations in the near future on routes to Bombay, Cape Town and New

FRENCH FOUR: Languedoc 161s are flying on Air France routes throughout Europe, except to Manchester and Basle. By the end of the summer the runways at the latter will have been extended, but if extensions to Ringway are not soon forthcoming, the Languedoc services may have to be withdrawn.

York. It is interesting to note that 90 per cent of C.S.A.'s aircrew learnt to fly in England during the war, many being Battle of Britain pilots.

* * *

Trans-World Airline is increasing transatlantic services from 34 to 44 flights per week with effect from June 15th. It is estimated that the 10 new flights will provide accommodation for over 4,000 additional Europe-bound passengers during the peak summer tourist season.

* * *

Ground tests of the high-intensity contact lights on runway 100°/280° at London Airport are being carried out, normally in daylight and under conditions which permit the use of other runways, but in an emergency runway 100°/280° would be available at short notice. The line of obstruction which extends down this runway for half its length, however, reduces its effective width from 300ft to 225ft.

* * *

There has been a steady increase in the growth of air traffic at Bromma Airport, Stockholm, during the last 12 years, as is shown by the following figures. During 1936 there were 5,338 aircraft movements at the airport, and 20,234 passengers with 120,000 lb of baggage, and 62,500 lb of freight and 214,900 lb of mail passed through. In 1946 the figures had risen to 34,926 aircraft movements, 181,520 passengers, 4,100,000 lb of baggage, 2,570,000 lb of freight and 827,000 lb of mail. Figures for 1947 show that owing to the strike the number of passengers handled decreased to 175,590, but aircraft movements increased to 39,061, baggage to 4,840,000 lb, freight to 3,900,000 lb, and mail to 1,065,000 lb.

* * *

Aer Lingus are understood to be considering the purchase of the new type Bristol Wayfarer to supplement the DC-3 fleet and replace the Constellations which were sold to B.O.A.C. Mr. R. J. Reynolds, sales manager of the Bristol Aeroplane Company, and Mr. A. J. Pegg, chief test pilot, recently returned from Eire, where the future equipment of Aer Lingus was discussed.

* * *

The I.C.A.O. Council has unanimously recommended to the Assembly of the Organization that Finland, which has so far attended meetings as an observer, be admitted to membership. The admittance to membership will require a four-fifths vote of approval by the I.C.A.O. Assembly and endorsement by the United Nations' General Assembly. At present there are 48 member states.

* * *

For the fourth year in succession Pan American Grace Airways has gained the Inter-American Safety Council award for its 100 per cent safety record during 1947. In this twelve-month period the company operated 6,830,039 flying miles, over an 8,878-mile route between the United States and eight Latin-American countries, without a single accident to passengers or crew.

FROM THE CLUBS

A revision of flying charges at the Coventry Aeroplane Club has been made, dual on Tiger Moths and the Auster being reduced to £2 15s, while the charge for solo flying is now £2 10s per hour. One of the Tiger Moths is being fitted with a blind-flying hood so that *ab initio* members who have been making use of the Link trainer will shortly be able to put their instruction into practice in the air. Sir Frank Spencer Spriggs, K.B.E., has consented to become patron of the club.

* * *

The new club-room and bar facilities at the West London Aero Club are now nearing completion; to the club's fleet of Fairchilds, Hornets and Tiger Moths a Miles Gemini has been added, affording members experience in flying a twin-engined aircraft. The Link trainer, which has been in use for some time, continues to prove very popular. Mr. W. G. Metcalfe's duties as club secretary have, owing to his departure to take up a post with the Royal Aero Club, been taken over by Mr. F. H. McDouall.

* * *

The resignation of Mr. John Webb from his office as secretary to the Reading Sky Observers' Club, reported in *Flight*, May 20th, was to enable him to devote more time to the affairs of the 51 branches of the British Association of Aviation Clubs, of which he is the founder and secretary. This Association is arranging visits to Percival Aircraft, Limited, Luton, Folkestone Air Races and to the S.B.A.C. display at Farnborough on June 26th, August 29th and September 11th respectively.

* * *

A member of the Northamptonshire Aero Club, Mr. J. Linnell, recently flew to France on a business trip and visited the International Air Rally of the Champagne Wines which took place at Epernay. He brought back with him a cup which he won for an observation and "time of arrival" competition. Approximately 1,000 competitors attended the model aircraft contests held at Sywell at Whitsunside. F/L. Youngman, the club's flying instructor, has returned from his 2nd-class navigator's course and a scheme has been started to organize parties of visitors from social clubs to have ten-minute "joy-rides" in a Rapide.

* * *

Since January 1st members of the Wiltshire School of Flying have completed a total of 1,030 hours' flying and 34 new "A" licences have been obtained making a total of 185 "A" licences taken since April, 1946, when the club reopened after the war. Associate membership is now available to those interested in flying, but not wishing to fly themselves, for an annual subscription of 5s; any member of another club may become a member of the Wiltshire club for the same subscription, 5s. There has been considerable interest in aero-towing of sailplanes recently and on May 5th Major Storey of the Royal Artillery Aero Club was released at 2,000 feet over Thruxton airfield and after flying 126 miles landed at Lympne. Residential accommodation at the club has been increased and 12 visitors can now be put up over-night. The total hours flown during the year ended May 27th, 1948, amounted to 2,716. A four-seater Miles Messenger and a D.H. Dragon have been added to the club's charter fleet, and the latter is proving very popular at the rate of 4d per passenger mile. Charters can be arranged at the following rates per passenger:—Paris return £8 10s, Dublin return £10, Jersey return £5, and Le Touquet return £4 10s.

* * *

On June 27th the Percival Aircraft Company, of Luton, have arranged to demonstrate the Prentice three-seat trainer to members of the Redhill Flying Club. An evening reunion party, run on the same lines as that which took place at Christmas, will be held on June 19th, beginning at 6.30 p.m., for which tickets (7s 6d each) may be obtained from the secretary, Mr. A. S. Burridge. The Chrislea Super-Ace aircraft is to be demonstrated at the small garden party which the club are giving on Sunday, July 11th. On this date there will be a tea patrol, open to private owners and other flying clubs, similar to the one held last year, when some 20 aircraft competed for free teas. During the last year 2,020 hours were flown and membership is now 307.

* * *

Recent additions to the private owners' fleet of the Derby Aero Club are two Mk V Austers belonging to Mr. Robinson and Mr. Bamford, the latter's being a de luxe conversion by Air Schools, Limited. Mr. Bamford and Mr. Neaum are both hoping to obtain delivery of Messengers soon. The club is now fully equipped for instrument training and night flying, and several members made their first flights after dark recently; this is expected to become a popular activity. Cross-country flying visits have recently been made to places as far apart as Shoreham, Hartlepool, Lympne, Dublin, Cornwall and Scotland, while Burnaston airfield has received many visits from other clubs. Arrangements are being made to show the Shell-Mex film "How an Aeroplane Flies" at the club-house in the near future. Owing to administrative difficulties it has been decided that the joint R.A.F.V.R.-Derby Aero Club "At Home" and flying display, which was to have been held on June 5th, as reported on page 544 of *Flight*, May 20th, has been postponed until June 26th.

"Dragon Service? Are you being funny young man?"

LAND/AIR WARFARE

No. 5 Special Senior Course at Old Sarum

AMONG the more spectacular and instructive demonstrations arranged annually by the R.A.F. and Royal Navy are those for students attending the Special Senior Officers' Course at the School of Land/Air Warfare, located at Old Sarum, near Salisbury. It is the custom to devote one day to "offensive support" and a second to "transport support," and to call upon the services of many squadrons and establishments. This year, the first display was scheduled for June 1st, on the West Down Ranges, and the transport demonstration was to take place on the following day at Netheravon. Unhappily, a quite ferocious wind and intermittent deluges necessitated postponement until June 3rd and 4th, when, it is understood, the programmes went off according to plan.

In general, the offensive support—or air weapons—demonstration, resembled its predecessors, except that, for some reason, Spitfire 24s predominated among the aircraft engaged. Two pairs of these most modern "Spits," in company with four Meteor IIIs, two Vampire Is and a Sea Hornet, attacked ground targets with their 20 mm guns; two more Spitfire 24s demonstrated skip bombing; and four others, having been briefed by an air contact team, illustrated dive bombing, using two 250-pounders apiece. Four similar aircraft, together with the same number of Naval Seafire XVIIs and a solitary Firefly, made a rocket attack, the Spitfires each with four 60 lb R.P.s, the Seafires with eight, and the Firefly with sixteen. In this type of attack they dive at an angle between 30 and 40 deg and release their rockets at about 600 yards. Three Mosquito XVIs marked a target for eight Lincolns (each carrying one 500 lb M.C. bomb and eight 25 lb practice bombs), and four additional Mosquitos, carrying the same bomb load as the Lincolns, demonstrated bombing underground radar control. Demonstrations by a Meteor IV, an Attacker, a Sea Fury, a Seafire 47 and two Vampire Is concluded the performance.

At the transport support demonstration, technical interest centred round a new universal freight container, dropped by a Halifax. This piece of equipment is still experimental and carries a payload of 6,000 lb; it will house a Jeep and a 6-pounder gun and measures 12½ft×5½ft×6ft. Even with eight 60ft parachutes, special pneumatic shock absorbers are needed. Shaped like a large rowing-boat, the container incorporates parachute quick-release gear, details of which are secret.

Another novelty in the programme was the dropping of R.A.F. Regiment paratroops. Royal Marine Commandos and Army paratroops descended from Dakotas and Halifaxes. Other items were the landing and unloading of Hamilcar and Horsa gliders; container dropping by transports and fighters; a glider snatch; and the deplaning, from three Dakotas and a York, of 104 troops. Equipment and troops were inspected by officers of No. 5 Special Senior Course. Towards the end of the display, a Hoverfly performed, a Lancaster dropped six containers with delayed-action parachutes, and a Hastings released two Jeeps.

R.Ae.S. GARDEN PARTY

FAIREY'S airfield at White Waltham will probably be the venue for the Royal Aeronautical Society's garden party this year. For some years past it has been usual to hold the garden party on the Sunday of the S.B.A.C. Exhibition but, since the public are being admitted to Farnborough on the final two days, it was found necessary to make other arrangements.

ACHIEVING PERSPECTIVE

DURING the late war, the employment of butchers, bakers and candlestick-makers in the making of armaments emphasized the difficulty that many people have in interpreting the conventional engineering drawing. Although draughtsmen were themselves at a premium during the war, and few could be spared to produce the more easily understood perspective drawings, some attempts were, nevertheless, made in this direction with considerable success. Quite aside from the value of perspective illustration for use by "unskilled" people, this form of graphic presentation has intrinsic qualities which, in many instances, cannot be matched by the orthodox working drawing.

A new draughting machine, the Perspector, originally designed by Messrs. D. M. Moore and A. G. Williams, of the Bristol Aeroplane Company's drawing office staff, is now manufactured by Isometric Projections, Ltd., Newport Pagnell, Bucks, and enables "parallel-perspective" views to be produced from ordinary engineering drawings. Forms of parallel-perspective, such as given by isometric and axonometric projections, have the advantage over conventional perspective that they may be scaled whilst, at the same time, a reasonably life-like representation of the object is depicted.

The Perspector is, in fact, a compound pantograph which is used in conjunction with two drawing-board surfaces, on one of which the original drawing is fixed and the outlines followed with the tracer point. The recording point moves over the second drawing-board and produces the perspective projection by means of a combination of pantograph linkage movement and sliding displacement of the drawing-boards relative to each other. As an example, a simple solid such as a cylinder may be considered. The original drawing will consist of an elevation, showing the cylinder as a rectangle, and an end view, showing it as a circle. The tracer point is moved round the circle of the end view, this movement causing the recording point to strike out an ellipse of isometric proportions. The sides of the cylinder are produced by traversing the table through the required distance from the highest point in the diameter and then from the lowest point, the tracer then being swept through a half-circle so that the recording point strikes out a corresponding half-ellipse, representing the "far" end of the cylinder.

Application of the Perspector is by no means restricted chiefly to circular shapes; it can also be used for complicated forms such as splining and gear-teeth. As an illustration of the rapidity of the system, a drawing of a splined, stepped shaft, carrying a gear-wheel, the side faces of which are undercut, can easily be made in twenty minutes.

NEW HULL FORM

AN experimental flying boat—the Martin XP5M-1—to be used for the evaluation of a new design of hull, has lately made its first flight at Baltimore, Maryland. The manufacturers claim improved flying performance and superior hydrodynamic behaviour for the new hull, which is characterized by a long after-body. By extending the planing bottom to the extreme stern of the aircraft a much longer base between the main and rear steps is provided, permitting, it is claimed, safer alightings in rough seas without excessive pitching and bouncing. Tail surfaces are protected from the sea by added buoyancy in the stern. Model tests are reported to have shown that the additional length will reduce the normal time and distance required for take-off, and that the new after-body gives exceptionally clean planing on take-off. In landing, the point of the step touches first and the aircraft is caused to nose down, so that "skipping off" does not occur.

Powered by two Curtiss-Wright R-3350 engines, each developing 2,700 h.p., the XP5M-1 is characterized by very large vertical tail surfaces. The rudder and elevator controls have power boost to reduce pilot effort.

A number of optional features will, it is hoped, provide even better operational characteristics than at present apparent. For instance, jettisonable sponson fuel tanks can be fitted for long-range operation.

The XP5M-1 over Chesapeake Bay on its initial flight, piloted by Mr. O. E. Tibbs, Martin "director of flight."

The embodiment of practical combat qualities

Speed

Range

Manœuvrability

Striking power

Docility at altitude

DE HAVILLAND VAMPIRE

D H AIRCRAFT

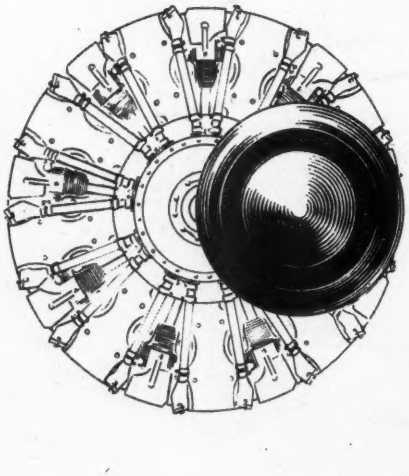
D H ENGINES

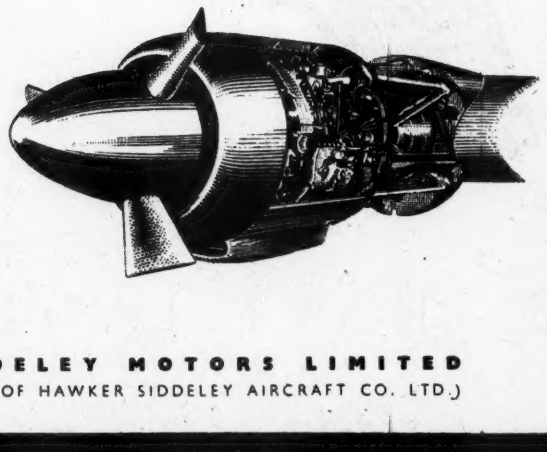
Mamba memoranda

No 1

FRONTAL AREA

The frontal area of the Mamba is less than 30 per cent of that of an equivalent piston engine.





ARMSTRONG SIDDELEY MOTORS LIMITED

PARKSIDE COVENTRY (BRANCH OF HAWKER SIDDELEY AIRCRAFT CO. LTD.)

One of the Constellations recently bought by B.O.A.C. from Aerlinte Eireann, the Irish airline.

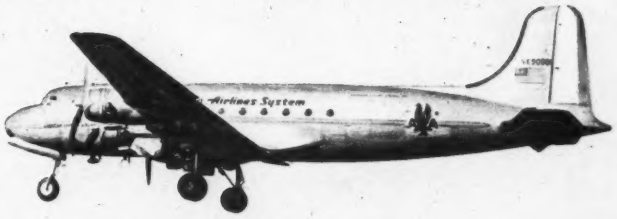
Fours Into London

The Four-engined Aircraft That Dominate Air Approaches to London

INTO London Airport and Northolt nearly a dozen types of four-engined aircraft fly passengers nd freight daily. Since the Metropolitan Control Zone became effective, at the beginning of this year, the bulk of air traffic has converged upon and departed from London through the three points of entry and exit: Gravesend, Dunsfold and Woodley. It is common practice amongst the operating companies to follow the same routes, even when flying contact, to maintain a standard procedure.

On the south and south-east routes out of London Douglas DC-4s and DC-6s have replaced their twin-engined predecessor, the DC-3, on K.L.M. services to Amsterdam, and with Sabena to Brussels and Antwerp, and during the past months they have appeared under the American Overseas Airlines' flag on schedules to Frankfurt, and to Scandinavia by the Scandinavian Airlines System. Also through the Gravesend gate fly the Pan American Airways Lockheed Constellations to Germany. Even on the short London-Paris route four-engined Languédoc 161s have replaced the twins, and also passing over Dunsfold the Argentine company

An A.O.A. Douglas DC-4, typical of the type flying on many European routes.



Tudor IVs are being used for freight only by B.S.A.A. on routes to South America. Air France are flying 40 Languédocs on services throughout Europe.

Fours Into London...

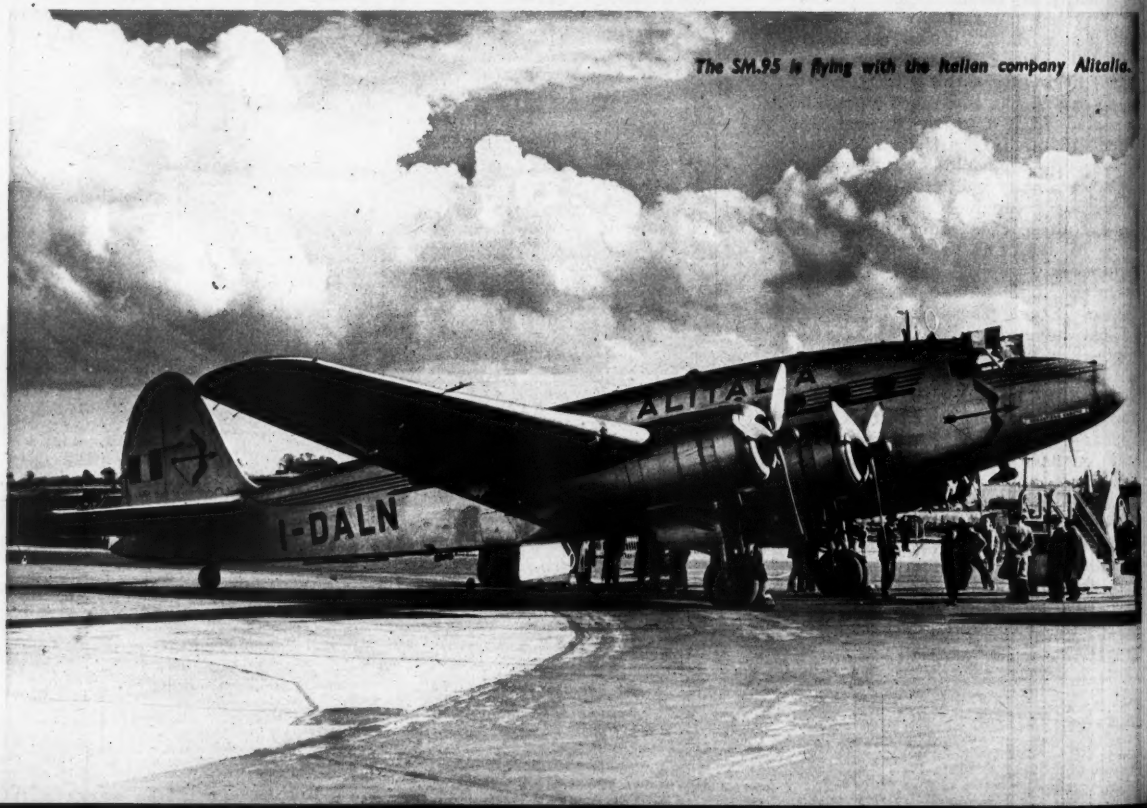
F.A.M.A. flies Yorks and Skymasters to Paris for their first stop *en route* to South America.

Through the Dunsfold gate B.O.A.C. Yorks fly to Castel Benito and Bordeaux *en route* to South Africa and the East. B.S.A.A. fly to South America through Lisbon, Pan American Airways to Istanbul, South African Airways to Castel Benito for the flight to Johannesburg, Panair do Brasil through Paris to Brazil, and Qantas, Swissair, Air-India International, all make up a flow of Lancastrians, Tudor IVs, Constellations and DC-4s across the Staines Reservoir and the Surrey hills to fan out from Dunsfold. The Atlantic traffic, flown with Constellations and North Stars, passes close to Windsor and leaves the Metropolitan Control Zone at Woodley, near Reading.

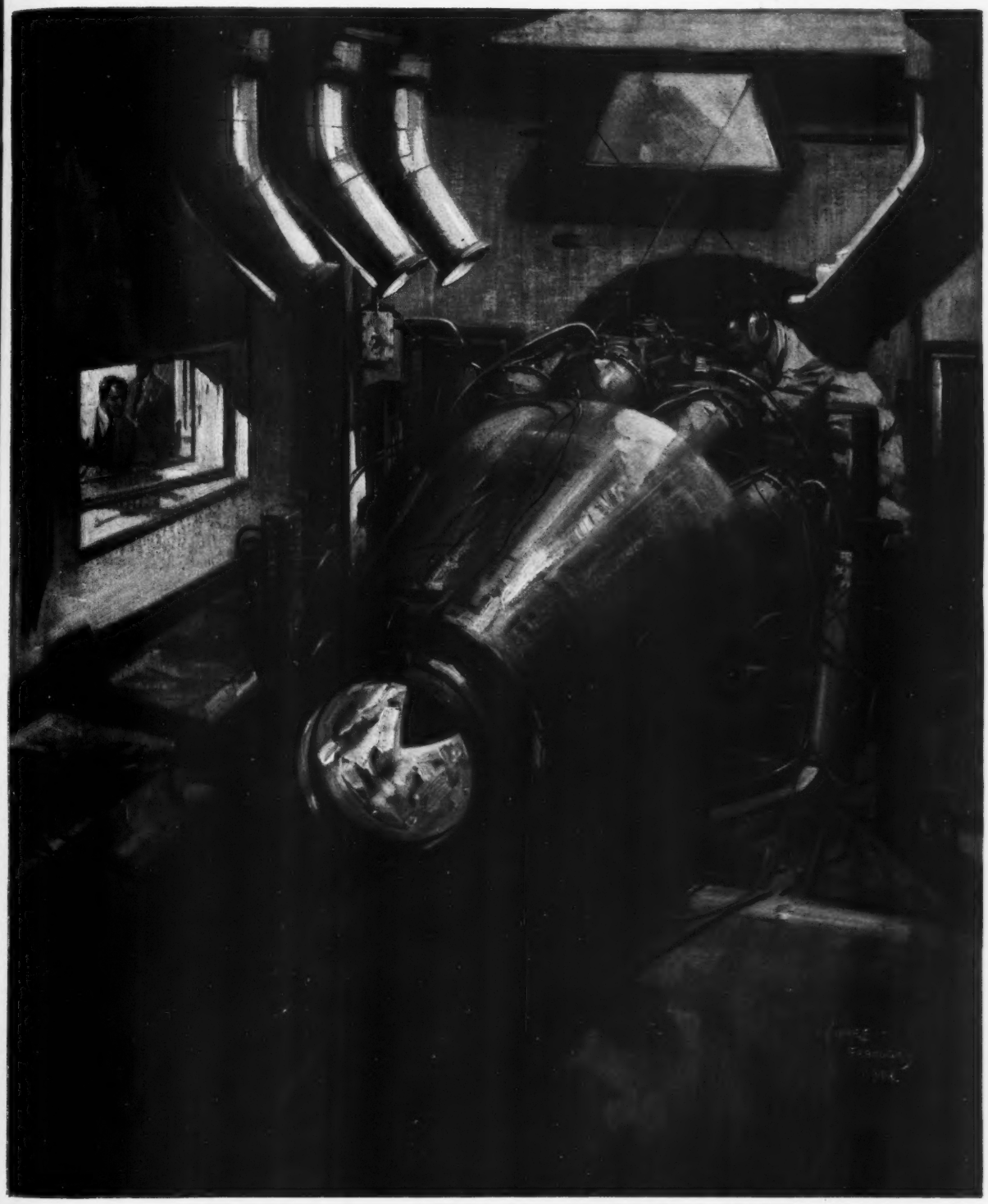
There is no mistaking the Douglas replacements, the grown-up DC-3s, with their large single fin and tubular shaped fuselage. The DC-6 differs in appearance from the DC-4 in details of the tail unit, the fin and the tailplane of which are noticeably more angular. Difficult to distinguish in flight, but nevertheless a feature, is the installation in the DC-6 of the more powerful Pratt and Whitney Double Wasp engines, and similar in fuselage design but unmistakable in sight and sound with its in-line Rolls-Royce Merlin engines is the DC-4M II or Canadair Four flown by T.C.A.

The Constellation with its three typical Lockheed fins and *retroussé* tail is easily recognized from any angle, as may also be the only other

(*Continued on page* 637)



The SM.95 is flying with the Italian company Alitalia.

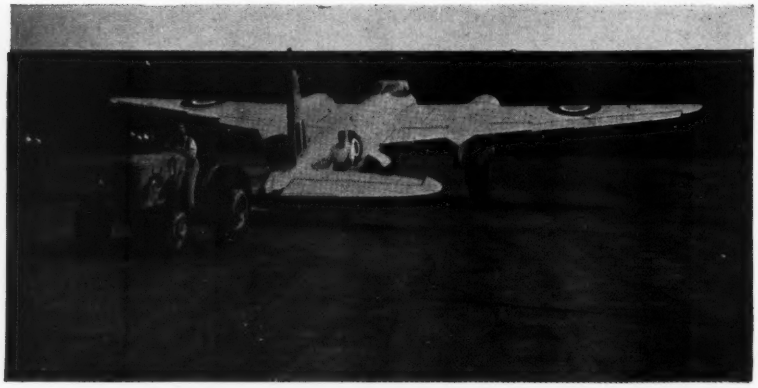


Intensive development for civil operation—a Ghost during a full-power run by night

DE HAVILLAND ENGINES

D'H ENGINES

FLIGHT June 10th. 1948 635—636



A Parade of Military Machines in Uniform — their Colours Bespeaking Duty and Nationality

Illustrated by "Flight" Colour Photographs

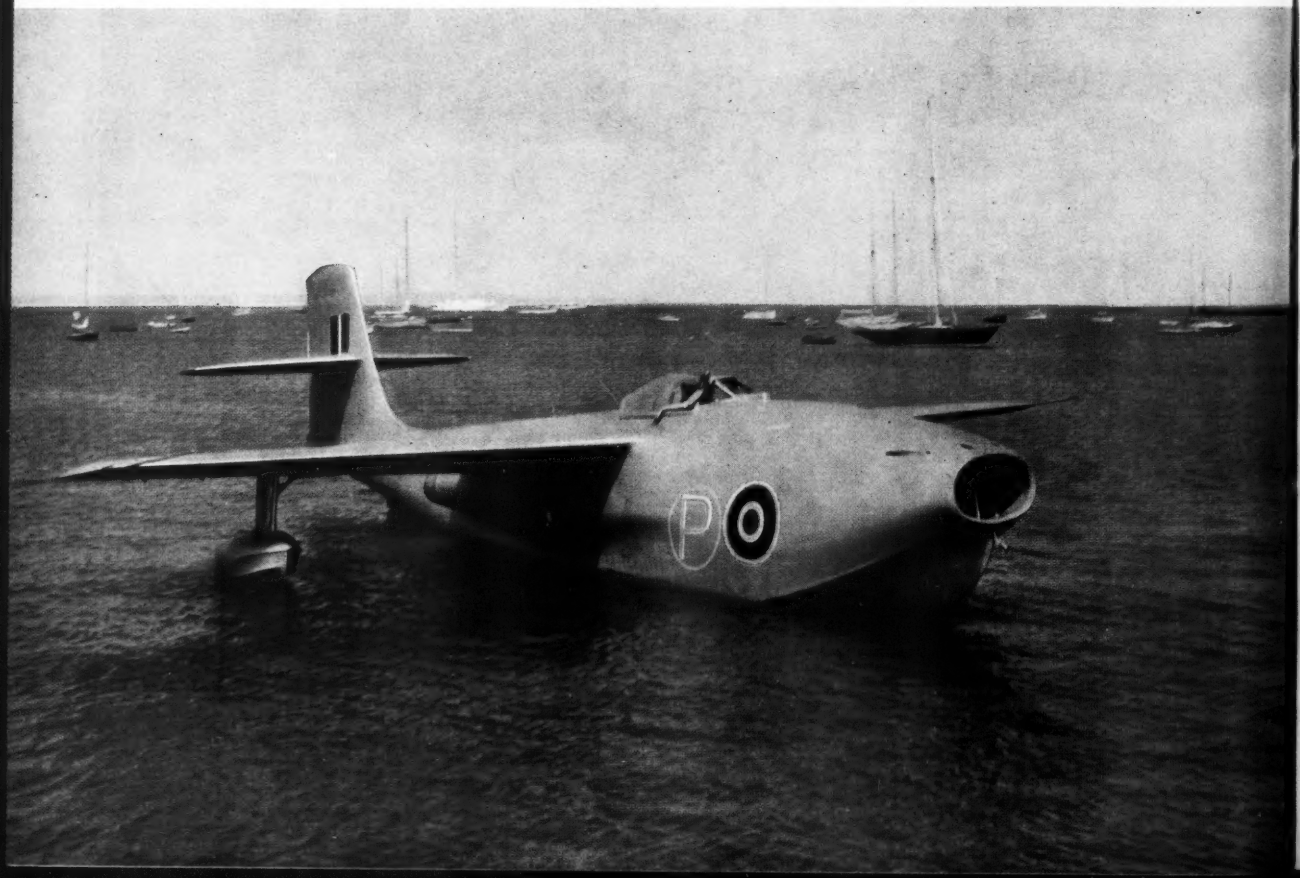
ALL DRESSED FOR THE PART

WARFARE by land and sea is to-day a drab affair. Personnel and weapons are deliberately made as inconspicuous as possible and the colours of a battle scene are generally those of nature, relieved by the flash of explosive. On the other hand, current military aircraft display gay colour schemes, rivalling in some instances the dashing uniforms of the old-time soldier. This will be instantly apparent on glancing at the small selection of types depicted on these pages.

Consider, first, the Mosquito T.III, finished in the "trainer yellow" specified for R.A.F. instructional machines as a warning to pilots, proceeding on their lawful occasions, to keep clear. These pilots would, of course, instantly appreciate that the pupil in the Mosquito was well advanced in his flying curriculum and, as likely as not, catching up on his instrument flying, or "converting" to operational marks of Mosquito. The "dual Mossie," though not common in the Service, is an eminently useful type. It is of the flat-windscreen, side-entry, fighter type, and has individual "sticks."

The perspicacious spotter, or student of aeronautical livery and heraldry, will straightway observe that the Saunders-Roe SR/A1 jet-propelled fighter flying boat, likewise depicted, is a prototype (signified by the yellow

The de Havilland Mosquito T. III trainer (above) is leaving its hangar at Hatfield before delivery to the R.A.F. Below, the Saro SR/A1 rides serenely on the tranquil waters of the Medina.



Spring sunshine at Langley falls on a dashing Sea Fury for the Royal Netherlands Navy. A tractor fussing round a British Sea Fury, seen in its austere, but highly protective underwear, lends added colour, and the blue of the sky is reflected in the silver wings of a Tempest. Below are a de Havilland Vampire III ("neat but not gaudy") and a Blackburn S. 28/43 single-seat strike aircraft, now on test for the Royal Navy. Like the Sea Fury, this type has a Bristol Centaurus engine.

"P"), and that the R.A.F. roundels are painted on the bow instead of on the after-body—a location dictated by the positioning of the jet effluxes aft of the wing. Less obvious is the reason for the retention of the yellow outline to the roundels—a legacy from the days when R.A.F. fighters were as heavily camouflaged as bombers.

There can be few more colourful machines in the air to-day than the Hawker Sea Fury fighter-bombers supplied to the Royal Netherlands Navy, one of which is seen at Langley prior to delivery. The splendour of this aircraft is accentuated by one of similar type in the background, seen in its primer coat; thus, *en négligé*, it will be put through its initial flight tests, as described in *Flight* of April 1st this year. The finish of the Furies and Sea Furies is of exceptionally high quality, and the machines being delivered to Holland and Iraq, with their beautifully applied national markings and insignia, are surely among the most handsome of the world's fighters.

Contrasting sharply with the gay Fury, the silver de Havilland Vampire III jet fighter is seen in its normal Service finish of plain silver. All day-fighters now being delivered to the Royal Air Force are similarly painted, resembling, in this respect at least, the pre-war Bulldogs, Furies and Gladiators. The Royal Navy, however, has not reverted to silver, and various camouflage schemes are to be seen on fighters and strike aircraft operated by Naval squadrons and establishments.

The last aircraft depicted here is the Blackburn S.28/43 single-seater strike machine, the yellow undersurfaces of which denote the experimental character of the type.

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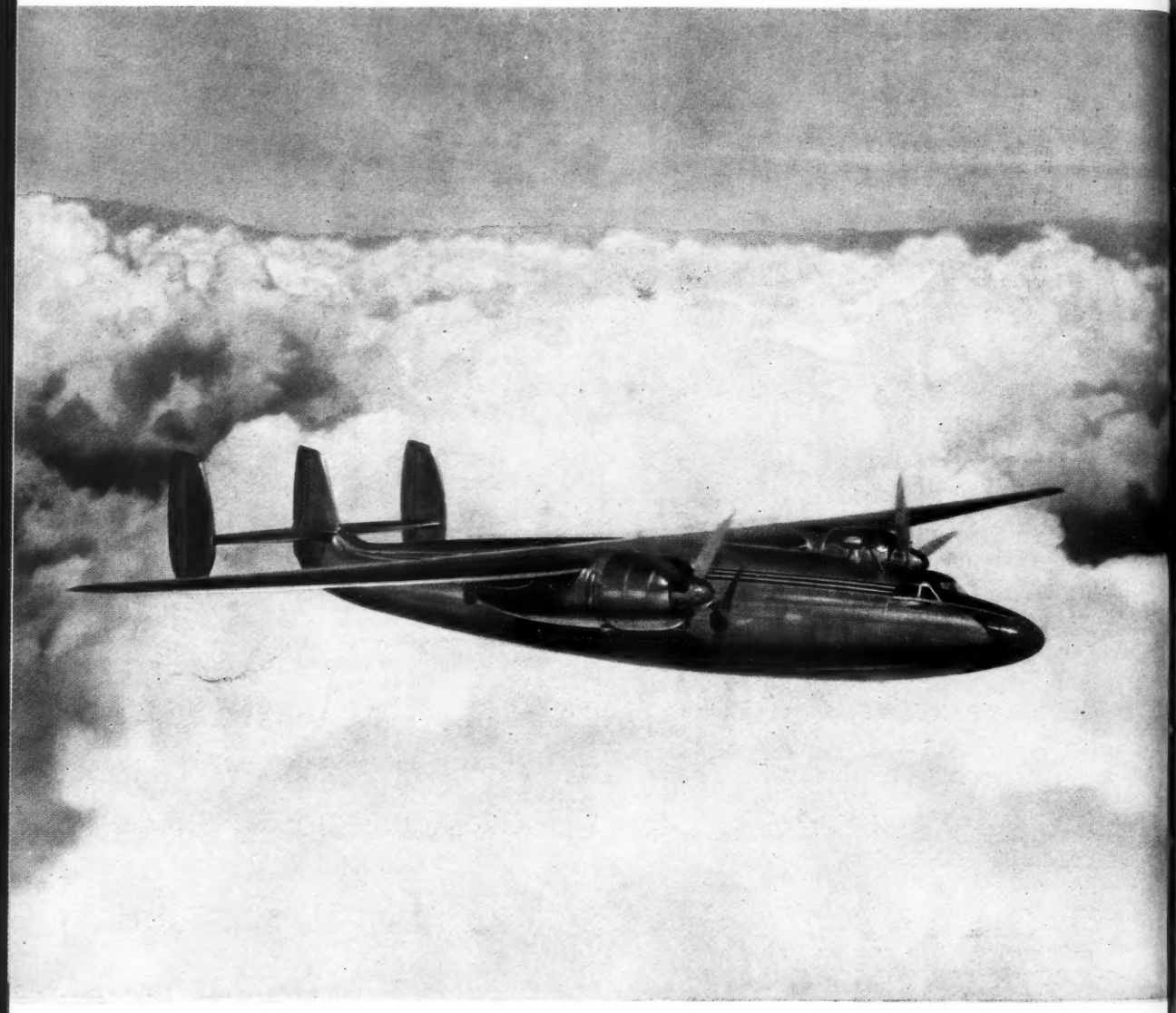
Mainliner of tomorrow



SPEED: Weak-mixture cruising at 285 m.p.h. at 10,000 ft.

SAFETY: A single-engined climb of 525 ft./min.

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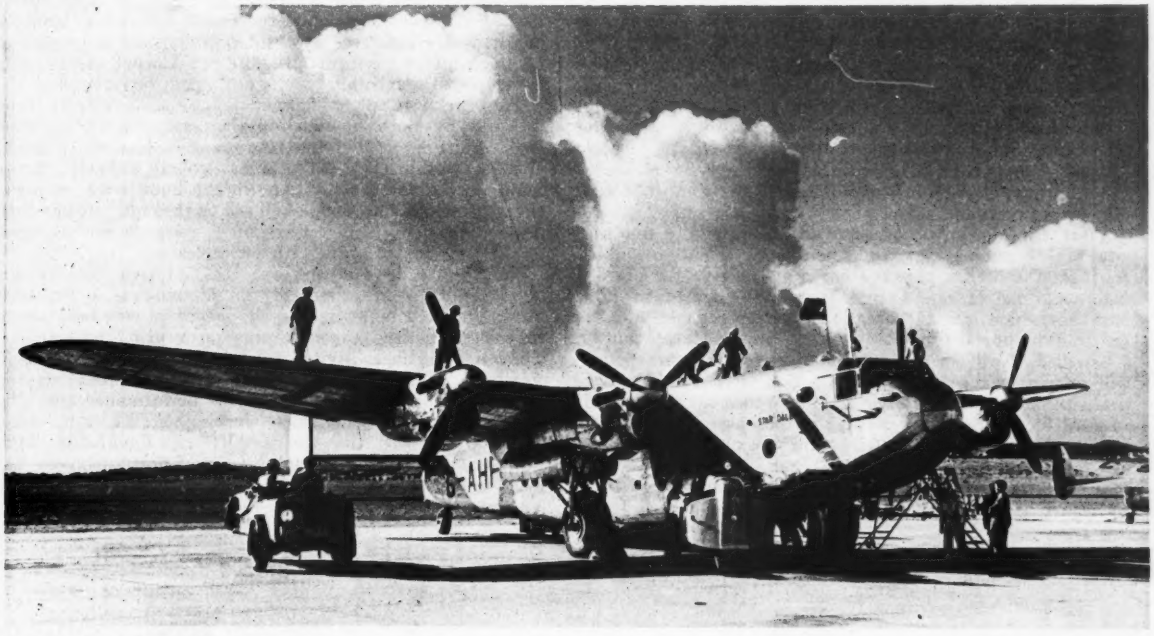
Fours Into London...

civil aircraft flying into London with three fins, the Avro York, which has the distinguishing feature of a square fuselage and high wing construction. The Tudor may sometimes, at first glance, be confused with the Douglas four-engined transports, but the extended fuselage, forward of the leading edge, the four Merlins and the high tail are prominent. From the same stable, but now becoming less evident on the air routes, is the Lancastrian with its double fins and the Perspex canopy breaking the topline of its slender fuselage.

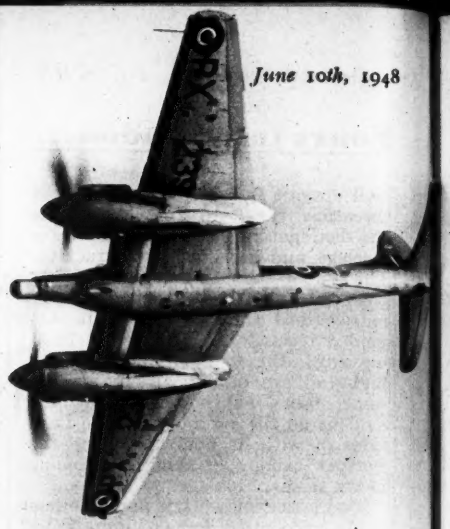
Two lesser known but none the less easily recognized foreign aircraft are the French Languédoc, with almost elliptical twin fins poised at the extremities of a high-wing tailplane, a slender fuselage and a swept-back leading edge; and the Italian Savoia Marchetti 95 flown by Alitalia with single fin and flat-sided fuselage. When in the circuit at Northolt it can easily be recognized by its slotted flaps, which give it a low landing speed.

In the next twelve or eighteen months Stratocruisers will be added to the collection of four-engined aircraft using the Woodley beacon, and perhaps earlier still the ex-Irish and now B.O.A.C. Constellations, and possibly Canadair Fours will be flying southwards through Dunsfold along the Empire routes. It will then be many years, in all probability, before further changes are made in the four-engined fleets of the operators. Intermingled with the scheduled services over the same routes are the four-engined Yorks, Lancastrians and Haltons of the charter companies.

Mark II North Stars fly twice a day into London.



Re-fuelling a York at London Airport. This interim type is still being flown by B.O.A.C., B.S.A.A., F.A.M.A. and Skyways. (Below) A Lancastrian coming in to land at London Airport.



Mosquito N.F.36s of Fighter Command. (Right) Sea Hornet N.F.21.

Night Fighters

IT is beginning to seem a long time since the communiqués were proclaiming the successes of R.A.F. Mosquitoes against German night raiders—a long time since John Cunningham and the rest were winning their dark victories. The fact is that the first Mosquito fighters (Mark IIs, without A.I. radar equipment) became operational nearly six years ago. Now the R.A.F. Mosquito night-fighter squadrons are being rearmed. At this late date some newer design—a contemporary of the Meteor, at least—might have been expected, but the type selected—the Mosquito N.F. Mk. 38—differs little from the N.F. Mk. 36 which it replaces.

Were the Mosquito not such an exceptionally fine and adaptable machine this would be a sorry situation indeed. As it is, the Merlin 113/114 engines will give the Mk. 38 little margin of speed over the twin-engined medium bombers which it may be called upon to engage, and the destruction of jet-propelled raiders, unless these can be "bounced," will be out of the question. Some people will remember the urgency with which nitrous-oxide injection equipment was installed in Mosquitoes to enable them to deal more effectively with Fw 190s and Me 410s. It is to be hoped that such a situation will not recur.

To the added credit of the Meteor it can now be said that this 585 m.p.h. single-seater is being operated at night by R.A.F. squadrons, though it is obvious that its value as a night fighter will be restricted by its relatively short endurance. The Vampire, too, is amenable to night operation. In Royal Naval units the Firefly IV and V suitably adapted, are available as night fighters, and a two-seater of much higher performance—the Sea Hornet 21— is being developed, though this type is not yet in service.

The Air Staff night fighter policy has evidently been dictated by both financial and technical considerations. No doubt it is argued that the night raiders which might assail us within the next year or two are unlikely, in the main, to be jet propelled, and in the knowledge, or hope, that "the good old Mossie will see us through" it has been deemed prudent to direct resources towards the rearming of the day fighter units with jet aircraft.

In the late days of the war the Germans adapted the Me 262—the counterpart of the Meteor—as a two-seat, radar-equipped night fighter, though they were fully aware that a specialized machine was an urgent requirement. They had, in fact, invited tenders for a "night and bad weather" fighter—a heavily armed multi-seater carrying elaborate radar and combining high performance and long endurance. The Americans, working on the same lines, are now testing the Curtiss XP-87, illustrated here. Powered with four Westinghouse axial-flow turbojets this massive machine seats a crew of two side by side and is as long as a Wellington bomber.

America's new night and bad-weather fighter—the Curtiss XP-87.

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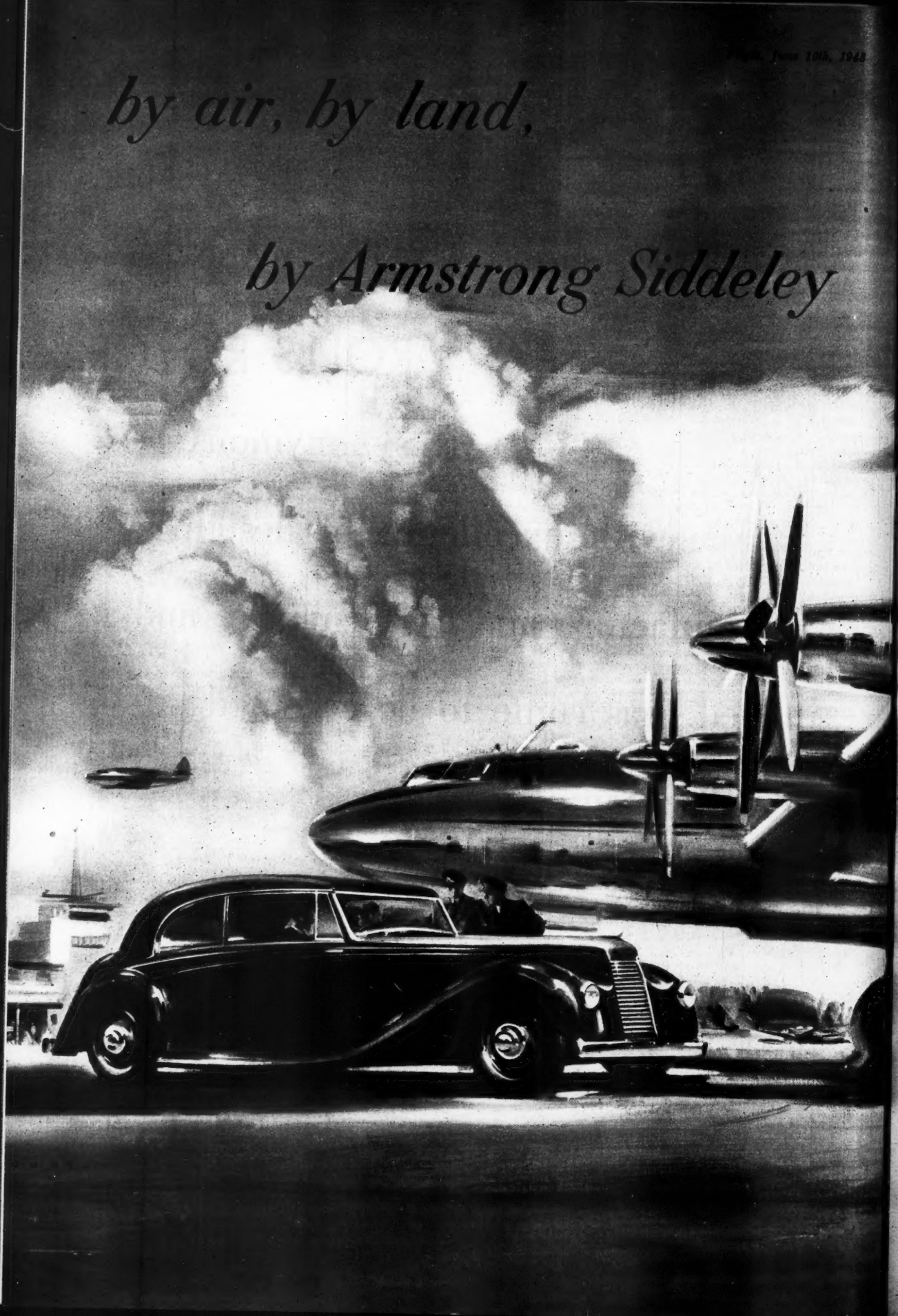
Aero

ENGINES

by air, by land,

by Armstrong Siddeley



ALL JET-FIGHTER AIR FORCE

U.S. Air Policy and Fighter Development

By "FAVONIUS"

THE ripening fruit of political seed-sowing by Presidential and Congressional Aviation Commissions is due to fall in Washington, D.C., at any moment now. By overwhelming majorities in both Houses of Congress, the proponents of a 70-group Air Force are now bickering over the final details for Presidential signature—or veto. Some idea of Congressional unanimity and, presumably, public feeling on this issue of keeping one's powder dry and the trigger cocked, may be gauged by the landslide solidity of these majorities—343 to 3 in the lower House and 74 to 2 in the Senate. Despite the fact that Congress has flatly over-ridden the Administration's earlier plan to fill in the framework of the current 55-group Air Force by bringing it up to full strength, a veto by President Truman is hardly likely. In any event it would be a useless gesture, since legislative enactment is now a certainty.

70-Group Air Force

Budgeting in round numbers for the fiscal year 1949, the joint Congressional appropriation for Service aviation now stands at approximately 3,200 million dollars, the military or Air Force side getting some 2,300 millions and Naval Aviation about 900 millions. (We purposely refrain from cluttering up the taxpayers' landscape with too many significant figures, since the last 8 digits are unlikely to have any perceptible influence on the rate of income tax!) Quickly following up Congressional sentiment, the Air Force has already announced procurement plans for the purchase of 2,727 new aircraft, comprising 1,575 jet fighters (Lockheed F-80, Republic F-84, North American F-86 and Curtiss-Wright F-87), 243 bombers (Boeing B-50 and North American B-45), and a miscellaneous assortment of 909 reconnaissance, transport, training, rescue and liaison aircraft. All these are scheduled for delivery by July, 1950, as a down payment on a 5-year plan to modernize the 70-group Air Force by 1953. (According to American military analysts, January 1, 1953, is being prognosticated as red-letter "A-Day," by which time the Iron Curtain may become an atomic sun-blind.)

All this talk of 55- and 70-group military aviation leaves the man in the street (who pays the piper) slightly dazed, for the public, as well as aircraft manufacturers, are more interested in actual aircraft units, rather than Air Force logistics. There is no hard-and-fast rule whereby one can translate groups in terms of aircraft, since the number of aircraft per group varies from 75 down to 30, in the case of fighters and heavy bombers, respectively. Present planning indicates that the 70 groups call for a potential of 6,869 first-line aircraft, broken down as outlined in the accompanying table. Current first-line strength is now about 4,000 aircraft, leaving some 2,800 still required for immediate expansion. Buttressing these 6,869 first-line units will be a reserve force of 13,672 aircraft, divided between an Air Reserve, an Air National Guard, and a "moth-ball" storage pool. Total military aircraft units, therefore, amount to 20,541.

Not to be too badly over-trumped by the Air Force, the Navy has announced procurement plans for the fiscal year 1949 calling for 1,535 new aircraft, comprising 807 fighters, 515 attack planes, 113 patrol planes, 20 transports, and 80 helicopters. Of this number, 746 will be jet-powered, and already accepted for production are the following fighter types: North-American FJ-1 Fury, McDonnell FH-1 Phantom and F2H-1 Banshee, Grumman F9F-2 Panther, and Vought F6U-1 Pirate. The new attack types will consist principally of Douglas AD-1 Skyraiders, Martin AM-1 Maulers, and Grumman AF-1s, all of which are piston-engined. By the middle of 1949, Naval Aviation is scheduled to reach a strength of 14,500 aircraft, divided between 3,300 combat aircraft, 2,700 fleet support types, 2,000 trainers, 3,800 under overhaul and modification, and 2,700 in reserve. Dropping the last odd couple of digits from the Air Force score-board, the combined military and naval air arms thus call for a round total of 35,000 units.

FIRST-LINE AIRCRAFT

Fighter, Day	1,898
Fighter, All-weather	125
Bomber, Light	276
Bomber, Medium and Heavy	709
Reconnaissance, Tactical	247
Reconnaissance, Long-range	203
Cargo, Medium	331
Cargo, Heavy	166
Transport	411
Trainer	1,994
Miscellaneous: Liaison, Rescue, Target, etc.	509
Total: First-line Military Aircraft (70 Groups plus 22 Squadrons)	6,869

American military aviation is now well advanced towards an all-jet fighter programme; to the point, indeed, where flight students are shortly to be weaned from the basic-trainer stage direct to the new Lockheed TF-80C two-seater jet fighter-trainer, recently developed from the F-80B Shooting Star. The well-tried and well-liked F-80B, which until recently was the Air Force's standard operational jet fighter (and is still being turned out at the rate of one a day), has now been joined in service by the Republic F-84B Thunderjet. The latter is now also completely operational and a total of 600 are currently under procurement. A top speed of 611 m.p.h. has been claimed for the specially prepared rototype XF-84, but the production F-84B model is reported to be in the 590-595 m.p.h. bracket, with a cruising speed of 500 m.p.h. and a range of 1,400 miles with external wing-tip tanks. Top speed is slightly better than the 585-590 m.p.h. of the F-80B, which is a notable performance in view of the corresponding engine powers and weights.

Technically, all this makes a pretty argument for the slide-rule jugglers. The difference is that whereas the F-80B is powered with the G.E.-Allison J-33 centrifugal turbo-jet, rated at 4,600 lb static thrust, the F-84B mounts the G.E.-Allison J-35 axial version, rated at 4,000 lb. Apparently the smaller frontal area (or wetted surface) of the F-84B fuselage, with its 37.5-inch diameter axial-flow turbine and nose air intake, more than counterbalances the higher thrust of the 50.5-inch diameter radial-flow turbine and side nostril ducts of the F-80B. There is, moreover, a weight differential in the argument, which is seen reflected in the empty weights of the two aircraft; thus the weight empty of the F-80B, with an engine dry weight of 1,735 lb, scales approximately 8,000 lb, whereas the corresponding figures for the F-84B are 2,425 lb for the engine and 9,000 lb for the aircraft.

Notwithstanding all these intriguing *pro et contra*, our personal hunch is that both these jet fighter types are classic examples of the military designer's art, and the U.S. Air Force is well mounted in this branch of the air arm. The position, in this respect, is much more comforting than it was some 18 months ago, when the earlier F-80As were having acute operational troubles with rivets popping and fuselage frames distorting during gunnery and bombing tests. This trouble at any rate has been cured. Sometimes, however, in our more pensive moments we could wish that all this clever engineering and pleasing aerodynamics might be devoted to something more useful than taking six machine-guns for a ride into the stratosphere!

Experimental Jet-Fighters

Not yet operational, but on the production line with 223 currently on order for the Air Force, the North American F-86A backswept-wing jet-fighter is an interesting augury of things to come, clearly showing the influence of the next step up the sonic ladder. Powered, like the F-84B, with the 4,000 lb G.E.-Allison J-35, the F-86A has obviously been designed to cater for much higher speeds and powers, in the 600-650 m.p.h. class. Gross weight is 13,715 lb, span 37ft, length 37ft, and overall height 14ft. Ceiling is given as over 40,000ft and range over 1,000 miles, and it is tolerably certain that the latter figure is nearer 1,400-1,500 miles with external wing tanks. Due to the backswept wing tips being located well aft of the C.G., the external wing tanks are mounted just outboard of the main landing gear shock-struts—a fact which also somewhat penalizes the width of the landing gear track. This track is about 22 per cent of the wing span, compared with 46 per cent for the Republic F-84B.

The wing design of the F-86A is notable in several respects, for it clearly evidences some of the structural and aerodynamic penalties of the swept wing. Structurally, in order to provide

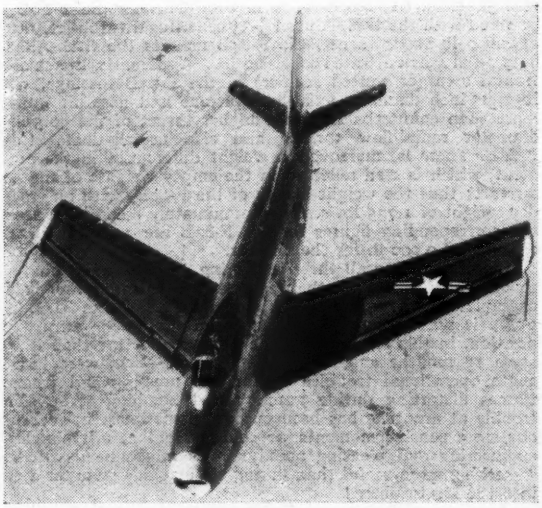
All Jet-Fighter Air Force . . . . .

the high torsional rigidity necessary with a thin wing section, the F-86A wing features a sandwich-type construction in which the structural material is laminated between inner and outer tapered skins; while the employment of long-span leading-edge slats bears witness to the acute control and stability aerodynamics of sweepback. There is indeed a certain parabolic touch of "bread upon the waters" in noting that after nearly three decades of invention, development and decay, wing slots are now being resurrected for lateral control on super-high speed aircraft. The U.S. Navy initiated this phase of full-scale high-speed control research with the Bell L-39 (an F-63 with sweptback wings) early in 1946 and the result is now being seen not only in the fighter class, but also in recent experimental bombers.

Local rumour on the Pacific coast has it that an experimental F-86A is now being groomed at Muroc with the new General Electric J-47 (TG-190) axial-flow turbo-jet delivering approximately 5,000 lb static thrust. Some reports even claim a thrust of 6,000 lb, which may be the "wet boost" rating for take-off or high-speed bursts. It will be recalled that the present world speed record of 650.6 m.p.h. is held by the straight-wing Navy Douglas D-558 Skystreak, powered with the 4,000 lb G. E.-Allison J-35. With some 5,000-6,000 lb thrust and a 35 degree swept-wing, the F-86A may be expected to cut a higher notch up the Mach scale and, possibly, recapture the speed ribbon for the Air Force. We say "possibly," in view of the Navy Douglas D-558-2 Skyrocket, which has now been flight-tested. The Skyrocket, of course, is rocket-boosted and, moreover, both it and its forerunner, the Skystreak, are pure research aircraft, whereas the F-86A has all the marks of a practical Service fighter.

After a long interval, Curtiss-Wright have re-entered the fighter lists with their XF-87, the first of which is now flying at Muroc. The company has received Air Force authorization for production tooling and an advanced production run of about 80, so it should not be long before this unusual aircraft drops its X-perimental prefix for the more productive F-87 label. It is described as a two-seater all-weather fighter and is powered with four Westinghouse J-34 (24-C) axial-flow turbo-jets, each turning out a thrust of approximately 3,000 lb for a dry weight of 1,200 lb and 27-inch diameter. The four power units are packaged in siamese pairs on each wing, the huge flat-sided, elongated nacelles looking like gigantic coffins against the thin plank-shaped wing. The horizontal tail is mounted high up on the vertical fin, similar to the Gloster Meteor.

Anything less like the usual day fighter specification it would be hard to conceive. Size and weight are in the night fighter or light bomber class, with a span of 60 ft, overall length of 65 ft, and a gross weight reported to be at least 30,000 lb. Even the landing gear has a bomber look about it, with both main and nose wheels arranged in duplex pairs. Top-speed is stated to be in the 600 m.p.h. class, range over 1,500 miles, and ceiling over 35,000 ft. Apart from its potentialities as a night fighter, it would look as if this "all-weather" specification has been framed to meet the rigours of Arctic operations. With its two-man crew, air-conditioned cockpit, and radar detection equipment, the F-87 is probably intended as a polar air sentry, designed to feel out and intercept any aggressor who might be tempted to trespass on the wrong side of the North American boundary fence. The Americans, incidentally, are laying down an extensive chain of strategical airfields in Alaska.



THE SHAPE OF WINGS TO COME: The new North American F-86A jet-fighter now going into production for the U.S. Air Force. The long-span leading-edge slats and 35 deg backswept wing are indicative of high Mach Number aspirations. The engine is a General Electric (Allison) J-35 4,000 lb S.T. axial-flow turbo jet.

The Fighting Flea

Following close behind these four jet-fighters now in, or nearing, the production stage, is an impressive array of near-sonic contenders, including the McDonnell XF-85 and XF-88, Northrop XF-89, Lockheed XF-90, Republic XF-91, and Convair XF-92. Of these, only the XF-85 is under flight test at this time. This is the bug-like parasite or escort fighter, designed for built-in protection of such super-heavy bombers as the Convair B-36, the intention being to stow it in the bomb-bay of the latter and launch it should the bomber be intercepted —as it almost certainly will. It reminds us somewhat of the witty Dean Swift's famous Rhapsody on the Flea—each flea has a smaller flea to bite him! It is also reminiscent, of course, of much earlier British experiments along the same lines with rigid airships and escort aircraft.

Altogether, the XF-85 is a very odd-looking insect. This miniature jet-fighter has a backswept wing with a span of only 21 ft, coupled with a body length of 15 ft, and is powered with the Westinghouse J-34 (24-C) 3,000 lb thrust turbo-jet aspirated directly from a nose duct. The outer panels of the wing fold upward and the only landing gear is a retractable hook let flush into the coaming ahead of the cockpit, by which it can be swung down from the bomb-bay, launched and hooked on again. It can also be fuelled and serviced on board the bomber, and can be jettisoned in case of emergency. The pilot sits atop the engine in a pressurized cockpit, looking very much like a jockey riding a barrel. Older still, however, is the quintuple tail surface configuration, probably necessary to stabilize the "tumbling" characteristics of the fat body. Top speed is claimed as high as 650 m.p.h.—which seems to be the popular high-water mark in American jet circles right now.

These straws in the west wind show the direction of American air policy and the beginning of an all-jet Air Force. We have chosen to look at the military side of the picture first, since Naval Aviation undoubtedly rates separate treatment—especially in view of recent squadron operational tests with jet-fighter (McDonnell Phantoms) on carriers, and the successful launching of patrol-bombers as big as the Lockheed P2V Neptune. And we shall have more to say on the subject of current and potential bomber development in our next article.

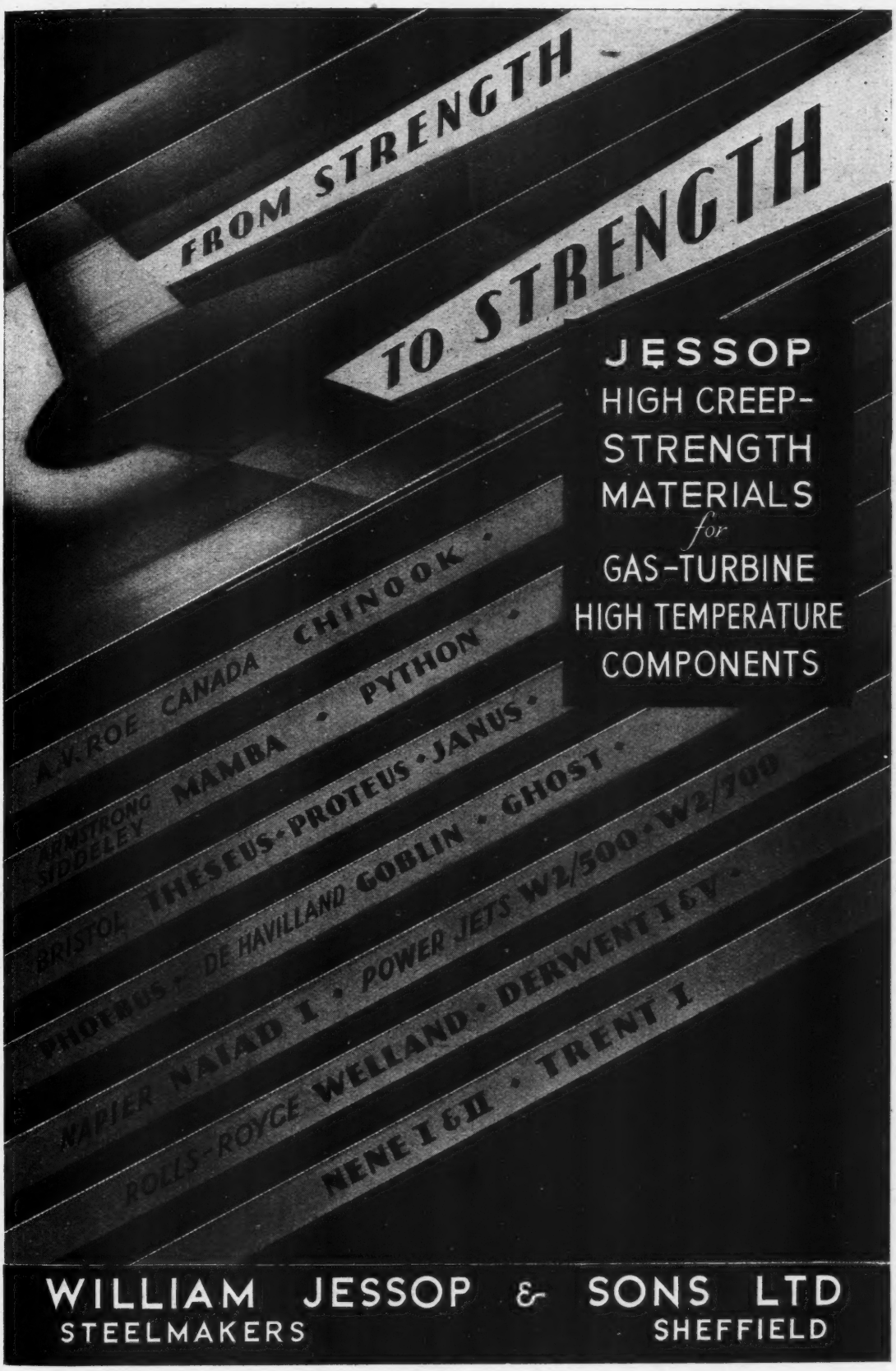
"FAVONIUS."

CRIPPS CONTROLLED APPROACH

IN order to assist the managements of producing and manufacturing companies throughout the country in the task of keeping their labour forces supplied with easily assimilated information concerning the economic recovery of the country as a whole, the Central Office of Information have produced the first issue of *Target* for the Economic Information Unit. A letter addressed to "the Managing Director" from Sir Stafford Cripps is printed on the first page of the publication. In this Sir Stafford reminds managements that men and women, whatever their rank or function, work to better effect when they clearly understand not only what they and their firms are doing but how these activities fit into the wider picture of national recovery as a whole. He goes on to point out that the Government cannot perform this service for them, but can, by pooling information and ideas in the publication *Target*, assist them in the promotion of policies of internal publicity.

An example of the system employed by Dunlop's to keep its workers supplied with interesting and up-to-date information is a simple illustrated chart showing, for instance, that one cycle tyre cover exported provides sufficient foreign currency to purchase 13 eggs, or 11 loaves, or 3½ lb of meat or 2 lb of butter. As a result of internal publicity efforts by Hoover (Electric Motors), Ltd., near Glasgow, in 5 weeks the 720 workers at this firm have increased their production of small electric motors by no less than 19 per cent. During the first week, in fact, of the information campaign production rose 14 per cent in spite of a serious breakdown which, incidentally, was overcome by a volunteer shift working day and night throughout one week-end.

Firms who consider that they have ideas for promoting the dispersal of information are encouraged to send them to the editor of *Target*. Contributions should be addressed to the Editor, *Target*, Central Office of Information, Norgeby House, Baker Street, London,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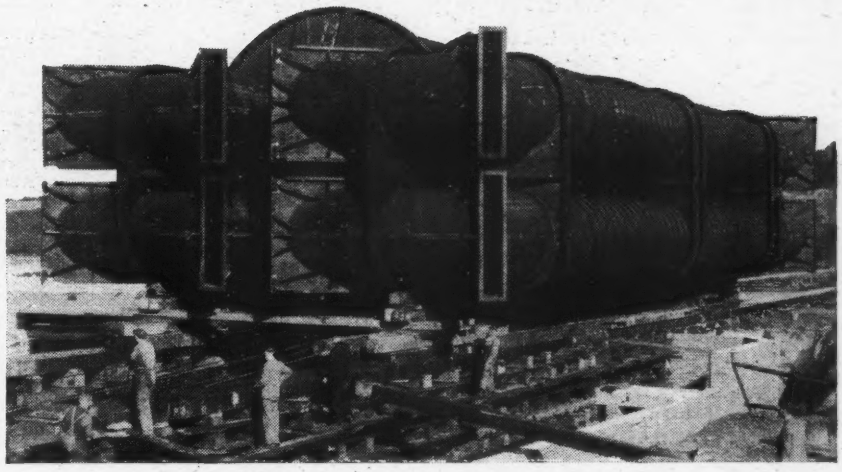
Synthetic Stratospherics

Development Equipment at Weybridge for High Altitude Research



The stratosphere test chamber being hauled up a slipway on to its foundations at Weybridge. Rectifiers-cum-cooler grids are mounted in the slots which can be seen at the elbows of the air circulation ducts.

ALTHOUGH high-altitude operation of aircraft has become something which no longer occasions much astonishment, the subject is relative, and one is, perhaps, too easily led astray by academic familiarity with intentions and possibilities whilst being inattentive to the fact that an aircraft which to-day can normally fly at 30,000ft is still something of a *rara avis*. A good deal is known about the upper air, and the general requirements for an aircraft designed to operate above the tropopause are, and have been, known for some little while. There is, however, a considerable gulf lying between knowing what the requirements are and providing them for a standard of normal day-in-day-out operation.

In aviation, a degree of research and development testing is demanded, wider in ambit and more intensive in character, than, perhaps, that required in any other field of engineering practice. It is easy to overlook the fact that aeronautics is still a young science, the operational realms of which are still largely unexplored, but it is certain that before any exploitation can take place some consolidation of the ground won is an essential pre-requisite. So far as high-altitude operation is concerned, the whole aircraft, engine, airframe, ancillary equipment and services, must either be specifically designed for operation at great heights, or must be appropriately modified to the same end. Research and development equipment for tackling the high-altitude problem is, by the very nature of the task, both complex and elaborate, particularly if full-scale work is to be done. The main essential is, of course, a decompression chamber, and the complexity and elaboration of such an apparatus increases disproportionately with the size, more particularly if the working range of altitude simulation is large.

Conditions at 70,000ft.

This is amply demonstrated by the stratosphere chamber now in process of construction at the Vickers-Armstrongs Weybridge establishment. This particular installation is designed for the reproduction of conditions of temperature and pressure such as may be experienced in any latitude and up to an altitude of 70,000ft.

The test chamber itself is a cylinder 25ft in diameter and 50ft in length, built up of ½in plate with external stiffening rings spaced at 24in centres throughout its length. On each side of the test chamber are a pair of air circulation ducts, 6ft 9in in diameter, these also being stiffened by external rings spaced at 16in centres. The enclosed volume is 40,000 cu ft.

Access to the chamber for the installation and removal of full-scale test specimens is through a massive door mounted on a carriage so that it can be moved aside, closure on to the joint face being made with a 40-ton hydraulic jack. Personnel entering the chamber go through two air-lock compartments at the fixed end, the safety valves, which can be operated in an emergency by a quick-release mechanism, also being embodied in the end diaphragm. Connections to pressure-sensitive instruments placed at critical points in the structure undergoing test are also furnished at this point. There are, in addition, a number of manholes in the top and bottom surfaces of the chamber, the covers of which can be replaced by glass observation panels or by special plates incorporating electrical leads or other connections.

The entire structure is carried on steel cradles, one at each end, that at the door end being fixed, whilst the other is supported on rollers to allow for expansion movement. Differential expansion in the structure itself is accommodated by steel bellows incorporated mid-way along the ducts and supported on independent pylons.

Construction of Chamber

Design of the chamber was the responsibility of Mr. B. N. Wallis, C.B.E., B.Sc., F.R.S., F.R.Ae.S., and the company's aeronautical research and development team, of which he is the chief. The complete fabric is of welded construction, was built at Vickers-Armstrongs' Naval Yard, Barrow-in-Furness, and transported by road to the site at Brooklands. The accompanying photograph shows the chamber being hauled up prepared ways from the erecting site on to its final foundations.

Thermal insulation will be effected by enclosing the chamber in a steel-framed building for the walls and roof of which insulating material 12in thick will be used; the floor will take the form of a concrete platform supported approximately 8ft above the main concrete foundations by brick piers. The cellar thus formed will have a free air circulation and the dangers of frost heave should, therefore, be avoided; the surface of the platform will be covered with a 12in thickness of insulating material but for the area beneath the support cradles, the material used will be of greater density and capable of carrying the weight at a distributed loading of 30 lb/sq in. The main access door will carry its own insulation, the joints being sealed with sponge rubber. It is estimated that the heat lost through insulation is 60 B.Th.U./hr/deg. C. of temperature change.

To produce the required conditions of low temperature, the refrigeration plant to be installed will be supplied in two stages. The first stage consists of four quadruple

(*Concluded at foot of next page*)

BIRTHDAY HONOURS

Orders and Decorations for R.A.F. and W.A.A.F.

ORDER OF THE BATH (Mil. Div.)

Knight Grand Cross

Air Chief Marshal Sir John C. Slessor, K.C.B., D.S.O., M.C.

Knights Commanders

Air Marshal The Honourable Sir Ralph A. Cochrane, K.B.E., C.B., A.F.C.; Air Marshal Sir Leslie N. Hollinghurst, K.B.E., C.B., D.F.C.

Companions

Air Vice-Marshal A. L. Fiddament, C.B.E., D.F.C.; Air Vice-Marshal A. C. Sanderson, C.B.E., D.F.C.; Act. Air Vice-Marshal R. A. George, C.B.E., M.C.; Air Commodore N. Carter, D.F.C.; Air Commodore H. F. Fuller, C.B.E.; Air Commodore J. S. Griffiths, C.B.E.; Group Captain G. I. L. Saye, O.B.E., A.F.C.

ORDER OF THE BRITISH EMPIRE (Mil. Div.)

Knights Commanders

Air Vice-Marshal A. F. Rook, C.B., O.B.E., F.R.C.P., M.R.C.S., D.P.H., K.H.P.; Act. Air Commodore F. Whittle, C.B., C.B.E.

Commanders

Air Commodore E. A. Lumley, M.C., M.B., B.Ch., D.P.H.; Act. Air Commodore H. S. F. T. Jerrard; Group Captain V. S. Bowling; Group Captain R. J. P. Morris; Group Captain H. M. S. Wright; Act. Group Captain J. W. Rose, D.S.M.

Officers

Act. Group Captain H. E. C. Boxer; Wing Commanders R. C. Ayling; W. Bowes; O. R. Donaldson, D.S.O., D.F.C.; S. C. George; M. R. McNama; W. B. Murray, D.F.C.; Act Wing Commanders J. S. F. Hood, R.A.F.V.R.; A. J. Nicholas; A. Sidney-Wilmot; Squadron Leader G. W. Salt.

Members

Act. Wing Commander L. E. A. Wright, R.A.F.V.R.; Squadron Leader G. H. R. Ackrill. Act. Squadron Leader M. G. Down, R.A.F.V.R. Flight Lieutenants D. A. Ansell; R. J. F. Day; W. G. Hales; P. M. S. Hedgeland; A. Hibbins, M.M.; L. C. Norris. Act. Flight Lieutenant I. J. Davies. Flying Officer J. Mackenzie. Warrant Officers A. C. Cook; A. Fieldhouse; H. F. Friend; W. E. Kingdom; L. G. Macey; L. H. L. Tobin. Act. Warrant Officer F. F. Harvey. Flight Officer J. M. Carlin, W.A.A.F.

BAR TO ROYAL RED CROSS (FIRST CLASS)

Chief Principal Matron N. G. Rees, R.R.C., P.M.R.A.F.N.S.

AIR FORCE CROSS

Act. Wing Commander J. E. Grindon, D.S.O. Squadron Leaders G. H. Duncan; P. O. V. Green; M. T. M. Hyland, R.A.F.O.; H. J. Raynor, D.F.C. Act. Squadron Leaders N. F. Duke, D.S.O., D.F.C., R.A.F.V.R.; J. H. Spurgeon, D.F.C. Flight Lieutenants S. F. Cooper, R.A.F.V.R.; N. T. Evans; W. T. Haxby, D.F.C.; W. D. Hooper; P. R. Mallorie; G. R. I. Parker, D.F.C., D.S.M.; P. H. Tew; C. A. Tomlinson; J. Tyszko, M.C., P.R.C.; D. K. Warburton. Flying Officers C. B. Lindop; G. H. Tasney. Master Pilot W. D. Bell. Master Signaller W. J. Ashcroft, D.F.C.

ROYAL RED CROSS (SECOND CLASS)

Sister J. M. Clarke, P.M.R.A.F.N.S.

AIR FORCE MEDAL

Flight Sergeant G. E. Matthews, R.A.F.V.R. Navigator I J. C. Reavell. Enginer II S. Wright. Gunner II J. P. l'Estrange.

BRITISH EMPIRE MEDAL (Mil. Div.)

Act. Warrant Officer G. Blore. Flight Sergeants R. Alderson; T. Lillywhite; W. J. Macleod; T. S. J. Nixon; H. E. Pike; W. C. Rendell; R. Wright. Act. Flight Sergeant R. B. Waite, R.A.F.V.R. Sergeants R. L. Allen; G. C. Bateman; R. Booth; R. D. Bune; J. C. Kennan; W. V. Milne; H. Phoenix; W. V. Rowe; R. C. Scotson; F. M. Shirtlitt; T. A. Wright, R.A.F.V.R. Pilot II H. E. A. Hurn. Corporals W. G. Duffin; E. F. S. Pullen; L. J. Smith; I. G. A. White; F. Wilkins. Leading Aircraftman C. E. Evans. Aircraftman 1st Class K. W. Seago, R.A.F.V.R. Flight Sergeants K. M. Hawkins, W.A.A.F.; D. A. Pulham, W.A.A.F. Sergeant D. E. Hester, W.A.A.F.

Synthetic Stratospherics . . . . .

compound ammonia compressors, each driven by a 150 h.p. motor, and will be capable of reducing the temperature inside the chamber to −55 deg C. The coolant used in the system is methanol, which is cooled by the evaporation of liquid ammonia, and circulated at a mass flow of 20,000 gall/hr through sixteen cooler grids, situated one at each of the elbows in the four air circulation ducts. These coolers consist of a number of specially shaped copper tubes carrying copper gill plates of 16 gauge at 1 in pitch, the unit matrix surface being 1,250 sq ft. The sectional shape of the cooler tubes is such as to allow their use as rectifying vanes for changing the direction of the airflow at the duct elbows. Air circulation in each duct is imparted by a fan which can provide velocities up to 100 ft/sec and is driven from an electric motor mounted outside the chamber insulation.

The second stage refrigeration, which is to be installed at a later date, will be capable of reducing the temperature to −70 deg C or lower. The converse simulation of tropic conditions will be obtained by shutting off the refrigerating plant and boosting up the fans, which normally run at low power, to 150 h.p.; it is estimated that a temperature of 70 deg C will be achieved by means of the increase in circulation velocity.

To simulate the pressure and density conditions of high altitude, a two-stage Nash Hytor vacuum pump will be installed; this will be driven by a 140 h.p. motor and the evacuation capacity is such as to permit reduction of the chamber pressure to 1/20 of an atmosphere in ninety minutes if required. Initially, the rate of evacuation is equivalent to a rate of climb of 1,000 ft/min, but in order to increase this evacuation rate further pumps may be added later. Moisture present in the circulated air would lead to icing within the chamber in low temperature conditions and, to obviate this, it is intended to install a plant for drying the air on entry. This plant will also serve to condition the atmosphere inside the chamber building.

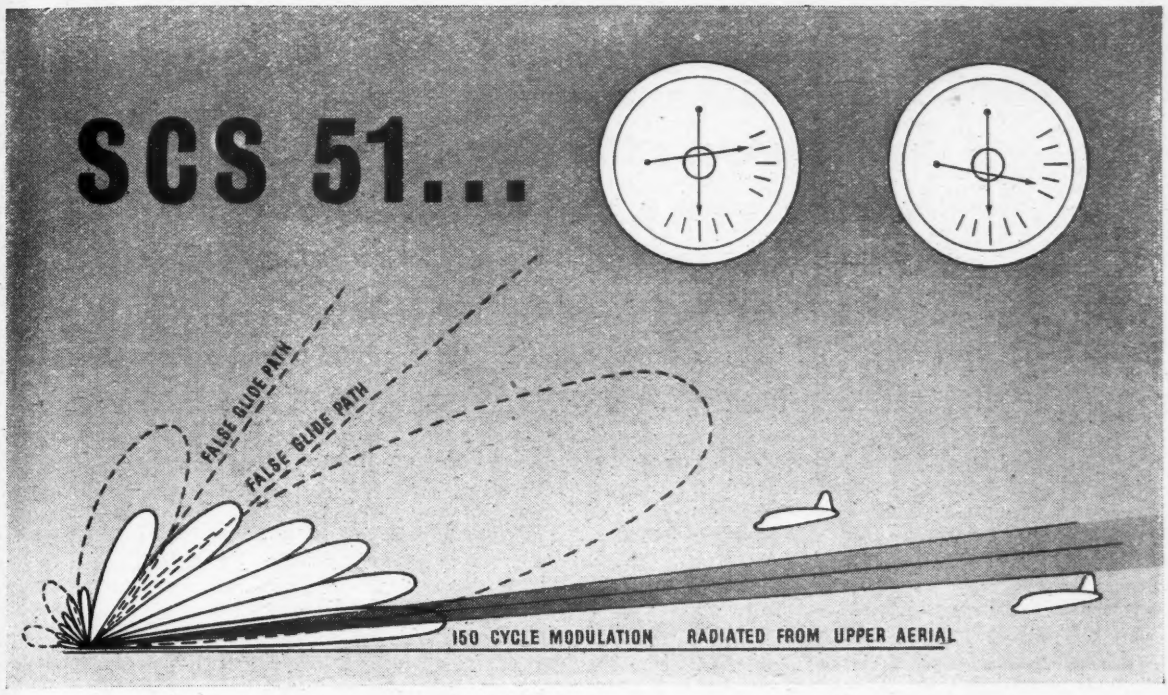
The whole of the atmosphere conditioning equipment will be housed in a separate building with the exception of the second-stage refrigeration plant, which, as a measure of precaution, will be isolated. In addition to the apparatus already mentioned, the main building will incorporate its own electrical sub-station with a supply capacity totalling 1,750 h.p.; however, since all the units will never be in operation simultaneously, the peak load is not likely to exceed 900 h.p. So far as is known, this installation at Weybridge is the largest of its kind either in existence or projected. Delays in material supplies have set back the schedule to some extent, but it is hoped to have the chamber in operation by early next year.

DATA

Pressure range	Atmospheric to 1/20 atm
Temperature range	+ 70 deg C to — 70 deg C
Equivalent maximum altitude	70,000ft above s.l.
Chamber capacity	40,000 cu ft
Duct circulation velocity	100ft/sec
Refrigeration	
Output	360,000 B.Th.U/hr at — 50 deg.C
Methanol flow	20,000 gall/hr
Condenser water flow	30,800 gall/hr
Total cooler surface area	20,000 sq ft
Insulation	
Surface area	19,000 sq ft
Thickness of insulation	12in
Thermal conductivity of material	0.21 B.Th.U/sq ft/in/deg F/hr
Thermal conductivity of enclosing building	330 B.Th.U/deg F/hr

HELICOPTER CROSS-COUNTRY

A CROSS-COUNTRY flight in a 35 m.p.h. wind has been completed by the Bristol Type 171 four-seater helicopter. The occasion was a trip from Filton to Lee-on-Solent, where the machine took part in a recent display for students of H.M.S. *Daedelus* senior staff officers' course. Despite bad weather, a convincing demonstration was possible. Mr. E. A. Swiss, a Bristol test pilot, who was flying the machine, described the performance during the 160-mile return journey as "Very satisfactory under extremely turbulent conditions." An indicated cruising speed of 85 m.p.h. was maintained. The machine concerned was the second Mk. I prototype.



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Radio and Radar Engineering Courses

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Ground Engineer's Apprentice Training

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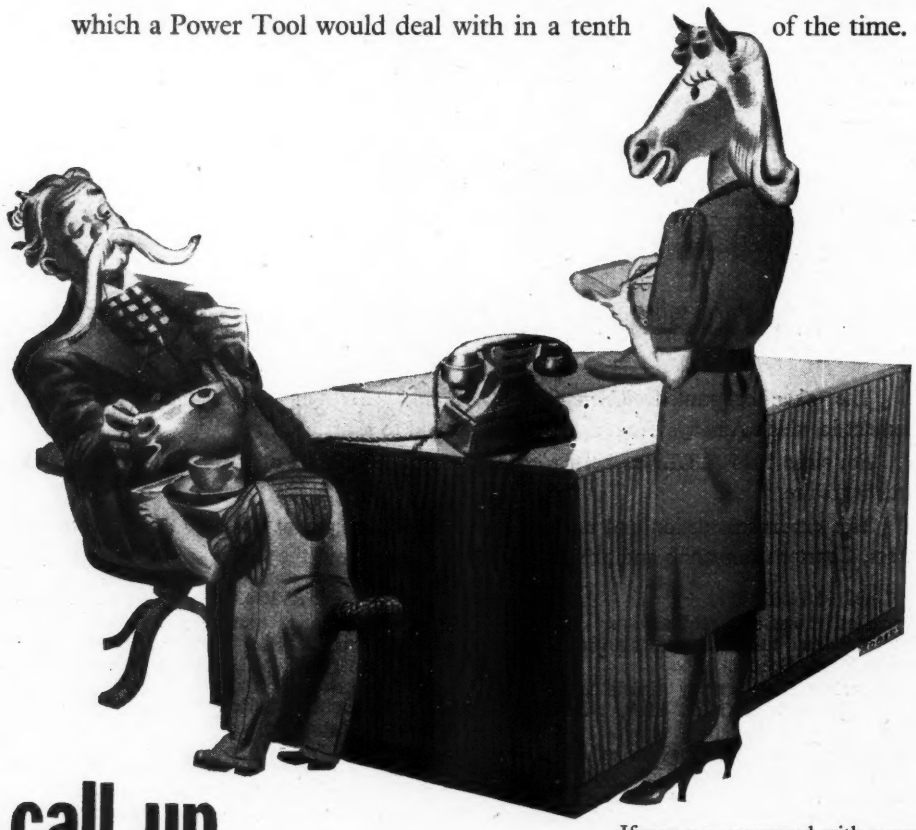

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C.R.C. 189

Article 41

An Explanation of the Clause in the Chicago Convention Which the Ministry of Civil Aviation is Seeking to Have Deleted

WHEN, in his speech at the Commonwealth Air Transport Council meeting on May 27th, Lord Nathan announced that the U.K. delegation was about to propose deletion of Article 41 of the Chicago Convention considerable confusion resulted. The P.I.C.A.O. Convention drafted at Chicago in 1944 included two articles relating to the adoption of standards: Article 90 refers to all standards, and in prescribing the procedure for adoption of all standards by the Council it leaves the Council free to select any dates for enforcement. A two-thirds majority of the Council to approve adoption is required and after a period for consideration a majority vote of member States can confirm or reject it.

Article 41 in Chapter 6, dealing with international standards and recommended practices, states that the provisions of the chapter shall not apply to aircraft and aircraft equipment of types of which the prototype is submitted to the appropriate national authorities for certification prior to a date three years after the date of adoption of an international standard of airworthiness for such equipment. The obvious good intention behind Article 41 was to prevent over-hasty action by the Council or member States.

It became evident later, however, that there were serious objections, in that the Article was subject to the widest variation of interpretation since national definitions of "prototype" could vary considerably, as for example in the later marks of Spitfire, which might be considered as prototypes or merely modifications of the original pre-war Spitfire Mark I. Also the submission for certification might be interpreted as the initial application for a certificate, the commencement of flight trials, or the lodging of the type record.

The Article also might delay the bringing into force of essential safety requirements for a period too long for acceptance. For example, if an airworthiness standard recommended by I.C.A.O. was adopted in 1948, then a prototype might be submitted in two years and 11 months' time, i.e., in 1951. When the prototype flew, perhaps in 1954, three years later, it would receive a Certificate of Airworthiness, after which the aircraft would be in production for perhaps four years, the last one coming off the line in 1958, so giving that aircraft a working life until 1968. Such a possible delay of 20 years could be extended even further to about 30 years if several development versions, each based on the original prototype, were produced.

In 1946 the I.C.A.O. Airworthiness Division met, the objections were appreciated and Article 41 was considered to be unsatisfactory, and it was recommended that: Each aircraft before being operated must comply with I.C.A.O. standards if introduced into international aviation for hire or reward after January 1st, 1951. All aircraft brought into use before that date could continue to operate until January 1st, 1954, when all aircraft engaged for hire or reward must comply with I.C.A.O. standards.

The British constructors agreed those dates and since 1946 have been designing and constructing to comply with the regulations. It is, perhaps, necessary to point out that although these clauses refer to all aircraft, the present standards in fact refer to those in transport category A, which includes large or medium multi-engined aircraft. Categories for single and low-power twin-engined aircraft remain to be developed. In the following year, 1947, the Airworthiness Division of I.C.A.O. confirmed the dates, but certain delegates pointed out that their views had been based upon technical requirements, and that their representatives on the I.C.A.O. Council might state a different view, having regard to the economic consequences.

United States Favoured Deletion

It is understood that at the last Assembly meeting the U.S. delegation unofficially suggested to the U.K. delegation that Article 41 should be deleted. The U.K. delegation was advised by the Ministry of Civil Aviation not to support the suggestion, upon which the Americans dropped the proposal.

Recently the Ministry of Civil Aviation discussed Article 41 with the S.B.A.C. and the A.R.B. and agreed that it was necessary and desirable to delete it, since legally it was meaningless and through its vagueness it was certainly dangerous. Moreover, the safeguard which Article 41 was said to offer against over-hasty introduction of new standards was considered by the S.B.A.C. and A.R.B. to be unnecessary in view of the majority vote required by Article 90.

The British delegation will move at the I.C.A.O. Assembly meeting in Geneva that Article 41 shall be deleted, but it is believed that the I.C.A.O. Council may raise objections to any such amendment of the Convention before 1950. It is important also that the question of dates for enforcing the Standards is closely related to proposals to amend the flight performance standards. The I.C.A.O. Air Standards have been substantially accepted on their technical merits with the exception of those for aircraft performance dealing with rates of climb and stalling speeds, which are considered by the U.K. to be irrational and liable to cause unnecessary economic penalties. The U.K. has already lodged a protest against the offending requirements.

At the next meeting of the Air Division the more rational performance requirements will be put forward by the U.K. delegation for discussion together with recommendations for any amendment to Article 41 if it is not deleted. All recommendations made by the committee will be pruned by the Air Navigation Committee before being submitted to the I.C.A.O. Council meeting this autumn. It is known that although the U.S. delegation in 1947 was in favour of keeping the dates, the operators may have taken the opposite view, since the dates affect mostly those aircraft which have come into service during the past four years and which have, probably, a life of 10 years. The operator's view will be expressed after the International Air Transport Association has discussed the problem.

SIR JOHN HIGGINS

AIR MARSHAL SIR JOHN FREDERICK ANDREWS HIGGINS, K.C.B., K.B.E., D.S.O., A.F.C., whose death occurred at his home in Leamington on June 1st, was one of the small band of high-ranking officers to have served in the South African War, World War I and World War II. Born in 1875, he went to Charterhouse and was trained at the Royal Military Academy, afterwards serving in the South African War from 1899 to 1902. He was one of the youngest officers to be made captain in that campaign, in which he was wounded, received the Queen's Medal with four clasps, the King's Medal with two clasps, and the D.S.O.

Like many other Army officers John Higgins attempted to transfer to the R.F.C. when it was formed, but was to find that he was considered too old to be a pilot. He returned to his regiment—the Royal Artillery—keenly disappointed, and shortly afterwards was promoted major. He was then asked to enter the R.F.C., and, on declining, was ordered to do so, being seconded in October, 1912, after having qualified as a pilot at Brooklands, as a pupil of the Bristol School. He commanded No. 5 Squadron when it went to France in 1914, but in October of that year was wounded. He subsequently became C.O. of No. 4 Wing, Netheravon, and later commanded the 3rd Brigade.

Many stories are told of General Higgins's meetings with first world-war ace, Capt. Albert Ball, V.C. Unfortunately, these did not always end as agreeably as the latter would have wished. In one of his letters Captain Ball wrote: "All is going fine again and I am good friends with G. H. and all the ticks." A short time later, General Higgins, who always had a very high regard for Ball, said to him: "I am putting your name on a big board in the trenches to frighten the Huns." Ball then wrote home: "So much for the general, for I am in his good books again."

From 1924 to 1926, Sir John was A.O.C. Iraq, and was Air Member for Supply and Research of the Air Council from 1926 to 1930, when he was placed on the retired list. In 1939, however, he was recalled to the R.A.F. and was A.O.C. India until he was retired in 1940.

In addition to his Service activities, Sir John had other interests in aviation, joining the board of Armstrong Siddeley Motors, Ltd., in 1930 for five years. For the same time he was also a director of Sir W. G. Armstrong Whitworth Aircraft Co., Ltd. Just prior to the last war he took a great interest in what is now the A.T.C., and also in the Boy Scout movement, and was a prominent figure at British Legion functions. Sir John leaves a widow but no family.

DUAL PERSONALITY: The Gloster Meteor is seen as a high-speed, dual-control trainer (nearer camera) and as a single-seater interceptor fighter. Future Meteor fighters will have the longer nose of the Trainer, though the present cockpit enclosure will be retained.

New Portrait of the King

THE new picture of the King, by Edward Seago—the first to be painted of His Majesty in R.A.F. uniform—was, on June 3rd, on view at the Royal Air Force Association's Headquarters at 83, Portland Place, London. Against a fairly dark background the King, hatless, is seen in the uniform of Marshal of the Royal Air Force. The portrait, for which three sittings of about 1½ hours each were granted, took 2½ months to complete and will hang in the Council Chamber of the R.A.F.A. Guests at the viewing were greeted by Air Marshal Sir Robert and Lady Saundby. Sir Robert is chairman of the National Council of the R.A.F.A.

Mr. Churchill Greets R.A.A.F.

ON the occasion of its Air Force Week, Mr. Winston Churchill has sent greetings to the Royal Australian Air Force. "We in England," he said in a message to Air Marshal Jones, Chief of the Air Staff, "remember with pride the gallant part played by the Royal Australian Air Force during the long and arduous struggle in the cause of freedom, and I am certain that your glorious tradition will remain as bright in peace as in war."

Promotion

THE Air Ministry announces the promotion to Air Chief Marshal of Air Marshal Sir Charles E. H. Medhurst, K.C.B., O.B.E., M.C., who was recently appointed Head of the Air Force Staff, British Joint Services Mission at Washington.

Air Chief Marshal Sir Charles Medhurst was appointed A.O.C.-in-C., Middle East Command in February, 1945, and Air C.-in-C. R.A.F. Mediterranean Middle East Command the following October. From August, 1943, to December, 1944, he was Commandant of the R.A.F. Staff College having been Assistant Chief of the Air Staff (Policy) from March, 1943, before which he was Assistant Chief of the Air Staff (Intelligence) for two years. In October, 1942, he was made an additional member of the Air Council while acting as Vice-Chief of the Air Staff. In February, 1940, he became R.A.F. Secretary of the Supreme War Council; in July, Director of Allied Air Co-operation, and in October, Director of Plans.

Royal Air Force and Naval Aviation News and Announcements

S. of S. at "Biggin"

ON Sunday, May 30th, the Secretary of State for Air, the Rt. Hon. Arthur Henderson, K.C., M.P., paid a visit to No. 600 (City of London) and No. 615 (County of Surrey) Squadrons, Royal Auxiliary Air Force, at Biggin Hill, Kent. He was received by A. Cdre. E. H. Davis, Air Officer Commanding, 65 Group (London Reserve), and A. Cdre. R. H. Spaight, Air Officer Administration, Reserve Command. After inspecting the Squadrons, he met the Commanding Officers, S/L. T. N. Hayes, D.F.C., and S/L. R. G. Kellett, D.S.O., D.F.C., respectively. The visit allowed the S. of S. to see a normal day's work.

PATRON: Edward Seago's new picture of the King for the R.A.F.A.

R.A.F.A. Conference

UNDER the chairmanship of Air Marshal Sir Richard Peck, K.C.B., C.B.E., vice-president of the Association, the annual conference of the Royal Air Force Association will be held at the Winter Gardens, Blackpool, on Saturday and Sunday, June 12th and 13th.

Appointment

A.V-M. ROBERT LINTON RAGG, C.B.E., A.F.C., formerly Air Officer Commanding No. 63 (Western and Welsh Reserve) Group, Royal Air Force, has taken up the appointment of Senior Air Staff Officer, Transport Command.

Before being given command of No. 63 Group in July, 1946, he was Air Officer in Charge of Administration at Air Headquarters, India, and he previously held a similar appointment at Base Air Forces' Headquarters, South East Asia. He was Deputy A.O.C. No. 222 Group, Air Command, South East Asia, for a year from April, 1944, and he was formerly S.A.S.O. of No. 15 Group, Coastal Command, to which he went in 1943 after having been in command of R.A.F. Station, Poole. From 1940 to 1942 he was a member of the British Air Commission, Washington.

Britannia Shield Competition

FIVE nations—Belgium, Czechoslovakia, France, Greece and Holland—have so far notified their intention of entering the Britannia Shield Competition this year. The United Kingdom will be represented by the R.A.F. The shield is competed for annually during Battle of Britain Week by sportsmen from the armed forces of nations which took part in the Battle of Britain or were assembled on British soil between 1940 and 1945. It will be presented to the winners this year by Mr. Ernest

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Service Aviation . . . . .

Bevin, the Foreign Secretary, at the conclusion of the boxing competition at Wembley on September 17th. This will be the third year of the competition, which comprises boxing, cross-country running, fencing, shooting and swimming.

Reunion

THE Headquarters Bomber Command Association of Officers will hold their annual reunion from 4 p.m. to 10 p.m. on July 17th, 1948. As in previous years the gathering will take place at Headquarters Bomber Command, High Wycombe, Bucks.

Return Visit

THE scheduled date for the arrival of a squadron of the Royal Swedish Air Force in this country was June 7th. Accompanying the squadron will be Major-General Axel Georg Ljungdahl who served as military and air attaché on the Swedish Legation in London in 1935-6. The General holds the British C.B.E., and is now Commander-in-Chief of the Royal Swedish Air Force Fighter Command.

Synthetic-Training Schools

TO save manpower and money and to bring about a uniform standard of instruction, the R.A.F. Central Vision Training School at Worksop, the Central School of Aircraft Recognition at Sutton-on-Hull, and the Central Link Trainer School at Kirton-in-Lindsey are being amalgamated into a Central Synthetic Training Establishment at Kirton-in-Lindsey, Lincolnshire. All three schools were established during the war and their purpose is to train instructors; all use synthetic training devices.

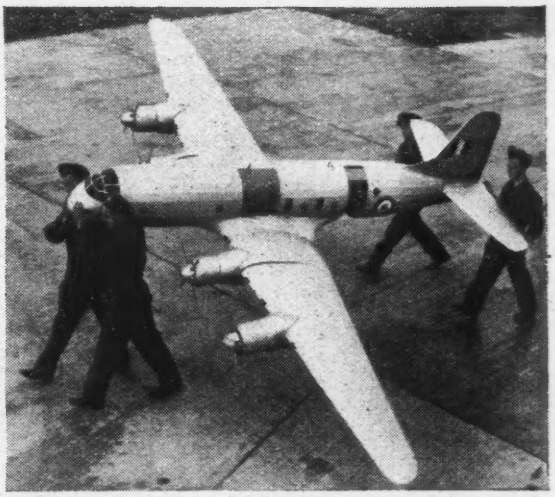
The Central School of Aircraft Recognition trains instructors for the Royal Observer Corps and the A.T.C. as well as for the R.A.F. At the Central Vision Training School, where the emphasis is on improved vision for aircrew engaged on night flying, the course lasts eleven days and instructors are taught the use of the devices by which night-flying conditions are simulated. The purpose of the Central Link Trainer School is, as its name implies, to train instructors in the use of the Link trainer.

Fighter Command Badge

A BADGE and motto for Fighter Command, R.A.F., have been approved by the King. The formal description of the badge is "in front of a Portcullis, a Sword erect." The motto is "Offence Defence." In the badge the portcullis and background are coloured Air Force blue, and the sword and the letters are in gold. The sword is indicative of the offensive operations undertaken by the Command, and the portcullis—a framework of timber lowered to protect the gateways of castles and other fortified buildings in olden times—is symbolic of its defensive role.

The Secretary of State for Air recently referred to the R.A.F.'s jet fighters as the best in the world. "We are confident," he said, "that we can in the future keep our superiority over all comers in the interceptor fighter class." The Air Officer Commanding-in-Chief of Fighter Command is Air Marshal Sir William Elliot, K.B.E.

Reserve and Flying Training are the only Home Commands of the R.A.F. still without badges and mottoes, but this will not be the case for long. The matter is now under consideration.



HASTINGS HANDLING TESTS: The Royal Tournament at Olympia, is to be opened by the King today (June 10th). Above is a scene at Brize Norton during a rehearsal of the R.A.F. set-piece, the subject of the model (made, incidentally, by four men) being the Handley Page Hastings.

Battle of Britain Lace

THREE more towns have been added to the list of those already announced where the lace panel made by a Nottingham firm to commemorate the Battle of Britain and loaned by them to the R.A.F. is to be shown to the public. The loan of a duplicate has now made it possible to show the panel in Derby, at the Midland Drapery Co., Ltd., from June 7th to 14th; in Lowestoft, at R. G. B. Chadd, Ltd., from July 19th to 31st; and in Ryde (Isle of Wight), at Hartnell's, from August 30th to September 9th. Only presentation copies of these panels are being made and one has been given to Mr. Churchill.

Cadetships for Airmen

THE upper age limit has now been raised from 18½ to 20½ for airmen, whether regulars or national service men, who apply for cadetships leading to permanent commissions in the General Duties, Equipment and Secretarial branches of the R.A.F. and the R.A.F. Regiment. These airmen are also exempted from the Civil Service Commissioners' written examination, but they still must undergo a medical examination and R.A.F. selection tests. There are three entries to cadetships—in January, April and September

Navigators' Careers

BECAUSE of a feeling of uncertainty about the commissioning and career prospects of R.A.F. navigators, an Air Ministry Order has just been issued which rules that all navigators shall have career prospects comparable with those open to pilots. While some navigators may still be selected for pilot training, navigators will be chosen as navigators for permanent commissions in the General Duties branch in the same proportions as pilots, and eligible for promotion on the same basis as pilots. Previously, navigators granted such commissions had to qualify as pilots. With the increase in range, speed and complexity of modern aircraft, this policy would now be too expensive in money and manpower, and it would be difficult to give these former navigators wide enough experience to make them thoroughly expert as both pilots and navigators. Aircrew navigators may already be promoted to higher aircrew rank under conditions comparable with those of aircrew pilots. In addition they will be given comparable opportunities of both attaining commissioned rank and of re-engaging for long service as aircrew with a view to pension.

The detailed implications of these decisions are now being worked out. The new policy will mean, for instance, that navigators will fill some posts, such as flight or squadron commanders, previously reserved for pilots.

Families Overseas

SOME 36 per cent of all R.A.F. married men overseas have their families with them. As more married quarters and civilian houses are built, this percentage will increase. The shipping position for families going overseas is now somewhat easier and in most cases berths can be obtained without undue delay.

Benevolent Fund in Scotland

AIR VICE-MARSHAL SIR JOHN W. CORDINGLEY, Controller of the R.A.F. Benevolent Fund, visited Edinburgh, Glasgow, and other Scottish centres during the week commencing May 31st to study progress made by the R.A.F. Benevolent Fund (Scottish Branch) in the first six months of its existence.

Discussions were held with Group Captain the Earl of Selkirk, the chairman, and other officials of the Scottish Branch. Among matters reviewed were working and machinery of the Scottish Branch in the light of results obtained; various aspects of the Fund's work to date; and the future policy of the R.A.F. Benevolent Fund as a whole. The Air Vice-Marshal also held discussions with A.V-M. Sir Hazelton Nicholl, honorary county representative for Argyllshire, and former Controller of the R.A.F. Benevolent Fund.

R.A.F. Pilots for Gliding Contest

THE R.A.F. members of the British Gliding team which is to compete in the International Gliding Contests at Samaden, near St. Moritz, Switzerland, from July 19th to 31st, have now been selected. They are W/C. P. P. Hanks, D.S.O., D.F.C., F/L. R. C. Forbes, and G/C. G. J. C. Paul, D.F.C. (reserve). All three officers are at present serving with the British Air Forces of Occupation, Germany.

Wing Commander Hanks is a former

Service Aviation . . . . .

Battle of Britain pilot; he won the D.F.C. in July, 1940, and the D.S.O. while commanding a fighter squadron in Malta in 1942. F/L. "Jock" Forbes joined the R.A.F. as an aircraft apprentice and later became a pilot. He started gliding only two years ago and has just qualified for the highest gliding badge—the "Gold C"—the qualifications for which are a distance flight of not less than 186½ miles, an altitude flight of 9,843 feet and a duration of not less than five hours. Only two other British sailplane pilots hold the "Gold C." During the recent B.A.F.O. gliding contests F/L. Forbes established a new British National record of 193 miles for a goal flight. G/C. Paul joined the R.A.F. in 1929 from the Cambridge University Air Squadron. During the war he held various posts, including command of a squadron in the 2nd Tactical Air Force. He is now a staff officer at B.A.F.O. Headquarters, and is chairman of the Association of B.A.F.O. Gliding Clubs. He recently made a goal flight of 192 miles.

At the Samaden contests, the R.A.F. pilots will fly against some of Europe's most experienced glider pilots.

Eye Specialist Promoted

GROUP CAPTAIN J. C. NEELY, D.M. (Oxon), the senior specialist in ophthalmology (the science of the treatment of the eye) at the R.A.F. Central Medical Establishment, Kelvin House, Cleveland Street, London, W., has been promoted consultant in ophthalmology there, with the acting rank of air commodore.

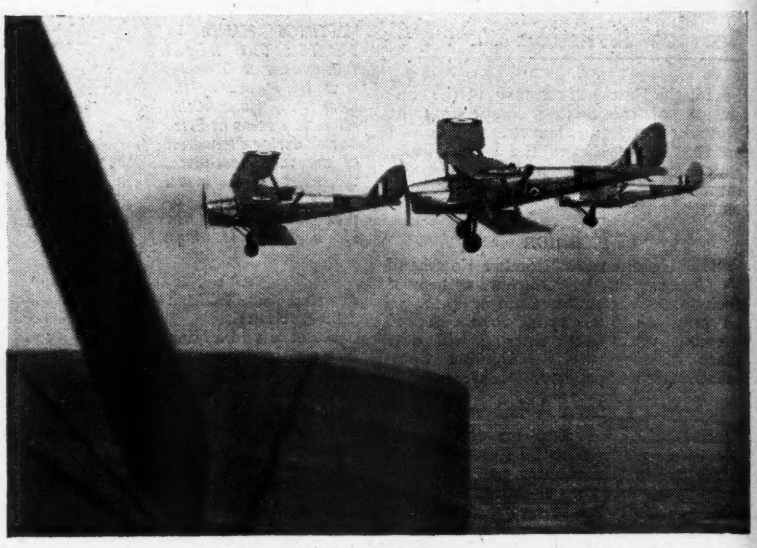
No. 65 Squadron in Sweden

SWEDEN could not have given a warmer welcome than it did to the personnel of No. 65 Squadron during their recent 10-day visit. Before leaving Stockholm for Uppsala on May 26th the officers were entertained at dinner in the Grand Hotel by the C.-in-C. of the Royal Swedish Air Force, General Nordenskiold. At Uppsala on the following day two of the Hornets and the York made air tests and F/L. Russum, who was to give an individual display of aerobatics over Stockholm, did a few practice rolls and loops near the airfield. It is a tribute to maintenance that only minor adjustments were necessary to the Hornets, and the mechanics had to do little but check over.

In a farewell message to Stockholm, A.V-M. Traill expressed deep gratitude for the friendship and hospitality extended by the people of the city to himself and all ranks. He was especially grateful that His Majesty King Gustav had been so gracious as to grant him an audience. The King's friendly manner and lively interest in the visit would never be forgotten. He also deeply appreciated the honour accorded by the Crown Prince and Princess in entertaining himself, Air Commodore R. L. Phillips, Group Captain F. L. White, Wing Commander W. A. Nel and Squadron Leader Haw at luncheon. "We have formed a very high regard and respect for the Swedish Air Force as a whole," he said, "and for the ability and bearing of its officers and men, and especially of its leaders."

On May 28th, in the Hall of Honour at the Cadet College at Uppsala, A.V-M. Traill presented R.A.F. ensigns to General Nordenskiold, for the Swedish Air Ministry, and to Colonel Lindahl for the station at Uppsala. Presenting the ensigns, A.V-M. Traill said he hoped that these would be flown on occasions as a token of the friendships made on the visit, which, he trusted, would lead to ever closer co-operation between the two air forces.

Soon after the ceremony the A.V-M. took off for Gothenburg and on the way dived over the residence of the British Ambassador in Stockholm, Mr. Harold L. Farquhar to pay his respects. The other twelve Hornets flew in formation over Stockholm on their way to Gothenburg, where another flying display was given.



PANSHANGER TIGERS: Since June last year, No. 1 Reserve Flying School at Panshanger, Herts, has reached a total of 7,000 hours' flying on training duties. Tiger Moths of the School are seen from a machine of the same type.

Permanent Commissions

THE following officers have been selected for permanent commissions in the branches shown:—

Technical Branch

W/C. S. H. Jordan, O.B.E.; S/Ls. J. F. Brown, M.B.E., C. V. Guest, O.B.E., H. A. Harrison, B G. T. Wormell; F/L. B. White.

Equipment Branch

F/L. A. Gillham.

Secretarial Branch

G/C. W. A. Hammerton; W/C. F. W. Wiseman-Clarke, M.B.E.; S/Ls. D. M. Halliday, H. G. Messer; F/L. E. Page.

R.A.F. Regiment

F/L. J. S. D. Hyslop.

Aircraft Control Branch

S/L. E. M. H. Slade, A.F.C.

Provost Branch

W/C. J. V. P. Henniker-Heaton.

Marinecraft Branch

S/L, G. F. L. Coates, D.S.C.

Short Service Commissions

THE following officers have been granted short service commissions in the R.A.F. as shown:—

General Duties Branch

F/Ls. L. S. Alden, W. L. Baxter, W. S. D. Bottrell, R. W. Bunyan, A.F.C., A. H. Chamberlain, P. Finding, R. W. Firmin, D.F.C., A. Hollingsworth, A. J. Lee, D. C. Marshall, R. E. Paul, E. W Talbot, D.F.C.; G. Whittaker; F/Os. K. J. Aedy, H. R. Birch, B. T. Corfield, A. G. Weller, C. R. White, D. J. B. Whitehead, J. P. Wilson.

Technical Branch

F/Ls. W. Scott, F. E. E. Truscott, B. Williams.

Equipment Branch

F/L. G. B. Pope; F/Os. J. E. D. Buckley, S. Dwight, H. Kitchen, H. McEndoo, J. R. Storey, S. F. Tillman; P/Os. G. Booth, E. J. Hesmondhaigh, A. G. Martyn, R. H. Ross, R. T. Smart

Secretarial Branch

F/Ls. J. Bailey, H. I. B. Crisp, A. D. Cunniam, E. Elliot, J. E. Fielding, L. H. Pollock, A.F.M., F. Robson, M. S. J. Wilson; F/Os. A. G. Coleman, H. W. Cornish-Underwood, D.F.C., H. W. B. Edmunds, H. G. Featherstone, D. G. Harvey, H. Liggett, M.M., D. G. A. Melrose, W. W. Oakley, R. J. Packer, E. J. A. Patterson, D. R. Perrin, D.F.C., J. Rothwell, D.F.C., J. J. Rushmere, B. T. Sambrook, R. Scarth; H. E. State, P. Turner, L. A. Walker, R. L. Willing; P/O. K. J. Salisbury.

Medical Branch

S/Ls. M. Robertson, L.R.C.P. & S., L.R.F.P. & S., M. E. G. Sherwell, L.M.S.S.A., P. R. Travers, M.B., B.S., M.R.C.S., L.R.C.P.; F/L. A. C. Akehurst, M.B., B.S.

Dental Branch

F/L. E. M. Hase, L.D.S., R.C.S.

Chaplains' Branch

Rev. J. R. Atkin (Church of England), Rev. E. D. Lewis (Methodist).

R.A.F. Regiment

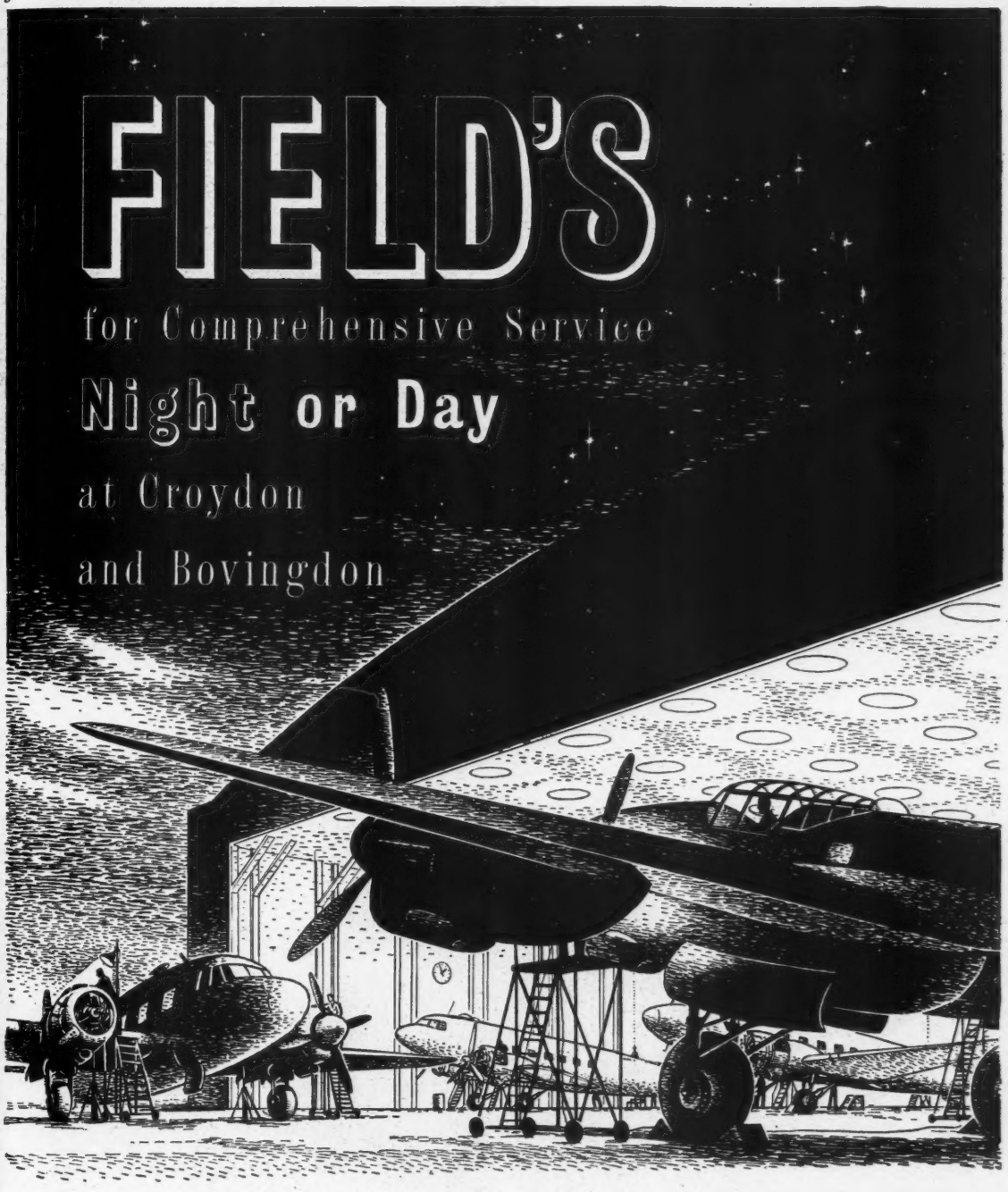
F/L. F. J. Coulson, R. Mather; F/O. B. Whiteside.

Physical Fitness Branch

F/O. W. P. Cooper, F/L. J. Cobb, D.F.C.

Catering Branch

F/O. F. H. O'Neill.



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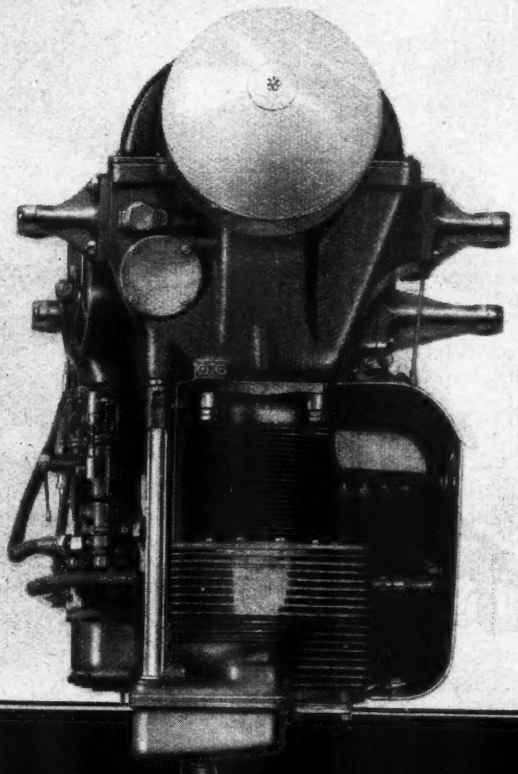

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The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

TOWARDS GREATER AIR SAFETY

THAT there is widespread concern regarding the number of cases in which an outbreak of fire following a crash landing has prevented rescue of the trapped occupants has been evident for some time. On May 20th we published an article in which the author made a close examination of the causes of accidents. Incidentally, we should point out that our printers changed the author's name into Hannan; it should have been Hannam.

There are many aspects of air accidents, and a great many causes if one includes both direct and indirect. Problems of improved navigational facilities are being closely studied in several countries. Mechanical failures are rare. But even with the best possible equipment, accidents will continue to happen, although it is to be hoped that they will be far less frequent. Below will be found many different viewpoints of readers concerning the form our endeavours to reduce fire risk should take.—ED.

Navigational Aids for Two-man Crews

RE your article "Towards Greater Air Safety" (*Flight*, May 20th), I note that the first improvement Mr. Hannam asks for is in navigation and ground/air control.

This, we all agree, needs improvement, but speaking as a charter pilot engaged in flying aircraft in the light category, i.e., Consul, Dove, Rapide, etc., I doubt if there will be much improvement until the radio equipment in this class of aircraft is improved.

It must be remembered that in this type of flying there is as a rule only a two-man crew, working in a very cramped space, with the pilot usually doing the navigating. Therefore, radio aids are perhaps more necessary to them than in an aircraft carrying a three-man crew.

Yet what do we find? It will be found that at least 75 per cent of this type of aircraft flying to-day have only one radio set, usually a combined M/F H/F transmitter and receiver of rather low output. This means that in bad weather, on a busy route when a dozen assorted airline monsters are screaming to the ground, the unfortunate charter crew are extremely lucky to be heard at all.

Then perhaps it is necessary to use a radio range (practically our only navigational aid when ignored by the ground and out of range of Consul) in which case you are out of communication with the ground altogether, there being only one receiver. The dangers of this near any busy terminal are too obvious to be elaborated upon.

It might be said, of course, that one should fly only to the limits of one's radio equipment, but met. forecasts are still notoriously inaccurate, and besides, this would practically restrict one to contact flight.

Now that an I.C.A.O. regulation is coming in which will insist on pilots having an instrument rating and proving that they are capable of using one of the let-down procedures, I do not think it is unreasonable to ask that the aircraft we fly be fitted with one or more of these aids.

In conclusion, I should say that the incidence of crashes in light aircraft due to navigational errors and bad weather would be cut down considerably if the minimum radio equipment carried by them was laid down as being M/F and H/F, W/T, V.H.F. or D/F loop, and S.B.A. or S.C.S.51.

Beckenham, Kent. "CHARTER TYPE."

Two Investigating Teams Wanted

ANY individual who helps to focus attention on the need to make aircraft safe to crash, is doing a good job.

For that reason alone our hat comes off to Mr. W. A. Hannam ("Towards Greater Air Safety," page 556, *Flight*, May 20th).

In particular, his statement, "If any useful knowledge is to be gained from the study of accidents, the cause of the crash must be examined separately from the result of it," deserves headlines.

We have been convinced, also, by many hours spent amid gutted wreckage, that two teams should be involved in the investigation: one to find out why the aircraft hit the ground (and this job must be doubly difficult in the present glare of publicity), the other team to *find out why the aircraft did or did not catch fire after it hit the ground.*

We have good reason to believe that this second team would produce statistics invaluable to the aircraft industry, always provided the data are correctly interpreted. We believe Mr. Hannam will agree thus far but no further.

His first two pages of most interesting reading draw attention to the fact that the interpreter of statistics must exercise much clear thought if he wants to arrive at a sound conclusion. Yet at the bottom of his second page Mr. Hannam is hoist with his own petard, and under his own power at that. In referring to two recent accidents he makes the alarming overstatement that: "In neither accident would lives have been lost if the aircraft had been fitted with reliable crash-proof tanks."

Come, Mr. Hannam, what of your warnings, and are not these two accidents still *sub judice* to a degree?

Would not Mr. Hannam agree that we have only scratched the surface of crash fire-prevention? That our meagre information, and his own common sense, shows that there is no one thing that in itself would be more than a palliative: that introduction of crash-proof tanks won't:—

(a) Prevent booster pumps pouring fuel from ruptured hose on to hot engines.
(b) Avoid high-pressure hydraulic lines being impaled on main electrical bus-bars.
(c) Eliminate the danger of up-draught carburettors and low-slung oil coolers being smeared off at first touch-down.
(d) Stop batteries tearing away from their cables before energizing well-tailored fire-protection equipment.
(e) Systematically wash out potential sources of ignition and sources of supply of inflammable liquids, etc.

We feel that these recent unfortunate crash fires may well stampede the industry into action it may well regret later.

We are convinced that the industry would not regret immediate formation of a small team of engineers charged with the responsibility for finding out why some burn and why some don't; not simply finding out why they crash; they always will. "Ex.Acc.6."

London, S.W.1.

Safety Fuels and Larger Control Surfaces

IN "Towards Greater Air Safety" your contributor, Mr. W. A. Hannam, made a very interesting survey of the problems of air safety and is to be congratulated on the constructive suggestions put forward.

I would like to join issue with him on two points, however, the first being that of safety fuels and the second that of the presumed difficulty of reducing deaths in future crashes in conditions where hitherto fatalities have usually resulted.

On the question of safety fuels, I would point out that there is a large body of opinion which believes that the difficulties in developing a suitable power plant are by no means as insuperable as those holding the contrary view suppose. I will content myself with observing here that if, for example, all supplies of ordinary petrol fuel were to stop forthwith for some extraordinary reason, I would be extremely surprised if aircraft were not operating on passenger routes within a year or two using diesel fuel.

Regarding fatalities through heavy crashes, I feel that Mr. W. A. Hannam must be unaware of the results of investigations carried out in the R.A.F. by the Directorate for the Prevention of Accidents during and after the war. These investigations showed that, however heavy the impact, the smallest amount of controlled deceleration was sufficient to prevent injuries or death in the great majority of cases. (A classic example of this, which was quoted to the Emergency Escape Committee of the Ministry of Aircraft Production, on which I sat for a time, was that of the woman who fell from a third or fourth storey into a soft flower-bed, with the result that the deceleration provided by sinking a couple of inches into the ground saved her from injury.)

Having made these small criticisms, I would like to second very heartily Mr. W. A. Hannam's conclusions that a great deal could be done to save the lives now all too frequently lost in crashes, not through the impact itself, but due to fire breaking out and the occupants not being able to escape from the aircraft in time.

Apart from safety fuels, which lie in the future, and the development of the safer, crash-proof fuel tanks Mr. Hannam advocates, I suggest the provision of a master control operated by the pilot which could, in emergency, be used to cut off both ignition and fuel tanks *from the source* of supply, in one quick movement. This, combined with an impact-operated switch to cut off all other electrical and fuel services, and impact-operated fire extinguishers, should greatly help to reduce the fire risk.

Incidentally, there is one other angle of attack, now I come

Correspondence . . . . .

to think of it. In a recent paper, Mr. Walter Tye, F.R.Ae.S., Chief Technical Officer of A.R.B., referred to the fact that in general British aircraft have smaller control surface areas than American aircraft and that from 1940-42 there were more accidents caused to the former by engine or handling failures. The two statements taken together seem to have some significance. Mr. Tye, in fact, seems to come to the reluctant conclusion that in most matters of design the U.S.A. is ahead of ourselves—their aircraft apparently need some 20 per cent less take-off distance due to improved flaps, and incorporate such advances as automatic feathering in the case of at least one modern aircraft, to give other examples of this superiority.

E. Twickenham, Mddx. D. G. H. (ex-R.A.F. Pilot).

Exit Notices Inside

IN Mr. W. A. Hannam's analysis of air safety (*Flight*, May 20th) he mentions crash tanks to diminish the risk of fire in a forced landing. He also recommends civil aviation to draw up a set of regulations to ensure a standard of safety which would afford passengers a quick, sure way of leaving the aircraft in event of an accident.

This, it would seem to me, depends on three things:—

One, an improved way of individual release from the lap-strap or safety harness.

Two, all emergency exits to be located easily from the *inside* of the aircraft, as, more often than not, the emergency exit is proclaimed to the world as such from the *outside*. But, alas, only too often is the fact waived for sleek, beautiful lines and superb interior décor instead of the notice being self-evident.

Three, tanks to withstand greater shock, especially at the fuel-pipe exit from the tank. (This cannot be too strongly stressed, as it is here that a fracture can so often occur.)

Of number two, I can speak with authority, as I am the chap who writes the signs for the aircraft, including registration, trade marks, and safety notices. Often, whilst writing the Emergency Exit notice on the OUTSIDE in wonderful large letters, the thought has struck me, "If only we could put this where the passenger could see it."

Number one, I am proud to say, I have done something practical about in minimizing the risk of passengers being trapped in an accident. It has been my fortune to devise an entirely new method of release in the safety-harness buckle. This I have proved to be four seconds faster than all present known makes of safety buckle in use. This new patent of mine is now in the prototype stage, I having scrapped the first attempt in its design for a more rugged type, which should pass all stress tests applied to it (A.R.B. will be pleased at this).

I am now confidently awaiting the views of the manufacturers before being able to say: "That's at least helped to save someone's life."

Number three is for the aircraft engineers and designers, and, therefore, when it comes, as I'm sure it will, I hope they, like the car manufacturers of to-day, will advertise it as a sales advantage and perhaps will advise us through your excellent magazine, which always goes a long way to iron out the industry's snags. "C.-OF-A. MICHAEL ANGELO."

Liverpool.

Reliability of Instruments

I REFER to the article by Mr. W. A. Hannam entitled "Towards Greater Air Safety" (May 20th).

Civil aircraft accidents are the subject of extensive enquiry, and one hesitates to put forward theories which are pure conjecture. Are we entitled, however, to dismiss as pilot errors and weather hazards those accidents in which aircraft flying over regular airline routes hit mountains, etc., when the crew concerned have maintained routine radio contact without indicating gross alarm?

Are we entirely satisfied with our blind-flying instruments? When aircraft hit mountains or just disappear (as in the case of the *Star Tiger*) the answer can only be:—

(a) Pilot error, yet it seems unlikely that an experienced pilot over a well-worn route would reduce altitude below safety minimum without letting anyone know.

(b) Structural failure of some vital control. A possibility but unlikely nowadays, and in the case of the mountaineers ruled out by subsequent investigation.

(c) Weather, radio information would surely be given.

(d) Instruments. Is the pitot-head heating adequate for all conditions and does it always work? Is there anything in the peculiar stories one hears about altimeter variations or is this just nonsense?

The writer once listened to an extraordinary story related by three high-ranking military pilots who got caught in the fringe of a cumulo nimbus in a medium-sized twin-engined aircraft. Air-speed indicators, altimeters, everything failed according to them; obviously they shouldn't have been there, but there are certainly other wartime pilots who have lived to tell the tale when such or lesser things have happened. It does not take long for an aircraft to be sufficiently out of control to topple its gyro instruments, and then what—particularly in a fair-sized civil airliner? One wonders what the variation would be if a number of altimeters, pitot heads, gyro instruments, etc., were given a simultaneous test under some synthetic weather conditions in, say, the R.A.E. altitude chamber. All this is asked in a spirit of enquiry.

To revert to another aspect of this article, viz., crash fire risks, it is difficult to see how crash-proof tanks help an aircraft which is making a crash landing, and possibly ploughing through trees, stone walls, etc. As your contributor rightly states, the occupants may still be all right, the human frame is very resilient, but petrol pipes and connections aren't, and the fuel escapes even though the tanks may or may not be ruptured.

I feel it is quite impractical to design aircraft with a view to their performance after a crash landing, and we should be very chary of suggesting to our regulatory bodies that they should extend their control into this sphere, otherwise who knows where it will end. The superimposing factor is that aircraft use heat engines, and that this heat is supplied by the combustion of fuel, which means that the engines are hot and the fuel inflammable. The only palliative is to reduce the volatility of the fuel so that, if a fire starts, the result is not some immediate catastrophic holocaust which is far beyond the powers of any fire appliances, should they be handy.

Low volatility fuels, commonly called "safety fuels," could be produced in the anti-knock range required for the spark-ignition piston engine. Common sense suggests that the use of such fuels would reduce the incidence of fire, and what is more important if fire occurred, increase the time available for the occupants of the aircraft either to remove themselves or be removed to safer quarters. Common sense can only justify their adoption. G. D. SOLTZ.

Chelsea, S.W.3.

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IN reply to Mr. Conway's letter in your issue of May 27th, no practical engineer would cavil at the statements made by "Comparator."

The incorporation of an additional shock absorber strut on the undercarriage is both cumbersome and unnecessarily complex, and will not relieve the main shock absorber of bending as does the levered suspension system. Consistently good results of levered suspension undercarriages both at home and abroad fully justify the comments made by "Comparator."

Mr. Conway's gratuitous apology for the over-enthusiasm of Lockheed's publicity department leads me to think that his letter shows the same over-enthusiasm for publicity, although perhaps not so unbiased as Lockheed's!

The "unique and revolutionary discovery" of liquid compressibility has long been known, but it was left to my company to find a practical application for this. Mr. Conway is apparently unwilling to give credit for this achievement, but even a self-styled "representative" of the British Aircraft Industry should appreciate merit when he sees it.

Cheltenham, Glos. G. H. DOWTY.

A number of letters have had to be held over until next week.

FORTHCOMING EVENTS

June 12th.—Wolverhampton Aero Club: "At Home."

June 12th and 13th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.

June 13th.—Henri Bardel Cup for model aircraft with mechanical motors.

June 16th.—R.Ae.S. (Hatfield): "The Development of the Brabazon I," G. P. Hepden, B.Sc., A.C.G.I., D.I.C.

June 19th.—Old Comrades Day for the Airborne Forces, Parachute Regt., Aldershot.

June 19th to 21st.—Royal Aero Club: Week-end for Foreign Guests, London.

June 20th.—Northern Heights Model Flying Club: Gala Day. Queen's Cup and Helicopter Trophy. Langley airfield, Bucks.

June 26th.—Derby Aero Club and No. 16 Reserve Flying School: Flying display at Burnaston airport (postponed from June 5th).

June 26th and 27th.—Butlin's Week-end Air Rally. Broom Hall, Pwllheli, N. Wales.

July 3rd.—Air Service Training: Flying display and "Open Day," Hamble airfield, Hants.

July 3rd to 5th.—Private Air Rally for members and associate members of the Royal Aero Club at Deauville, France. (Guests of M. F. André.)

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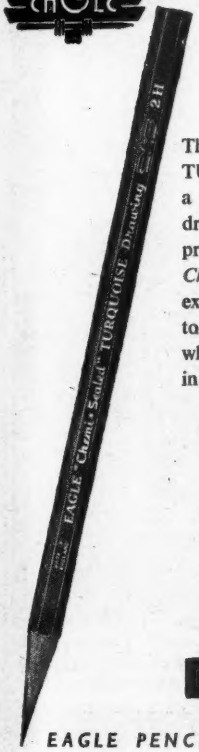

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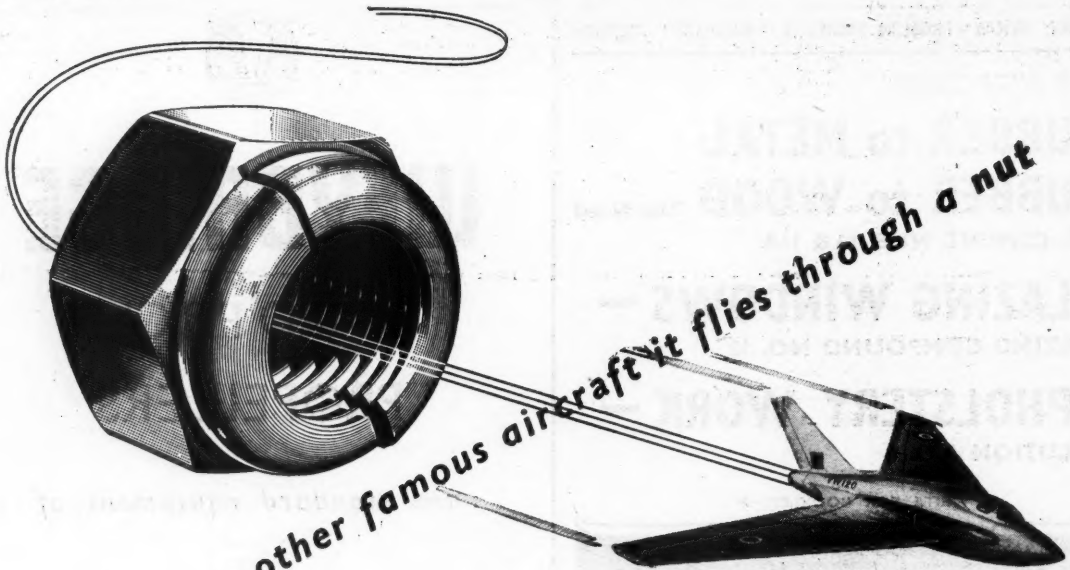

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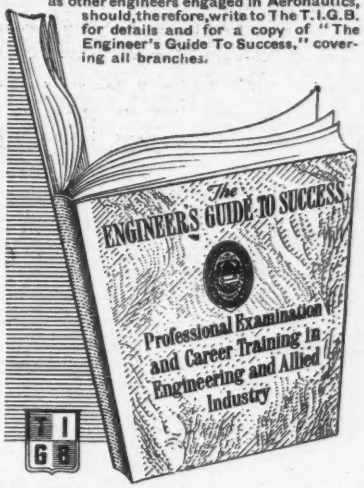
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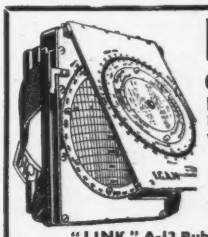

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SENIOR stressman required.—Please send details of training, experience and salary required to Chief Technician Gloster Aircraft Co., Ltd., Witcombe, Glos. [0369

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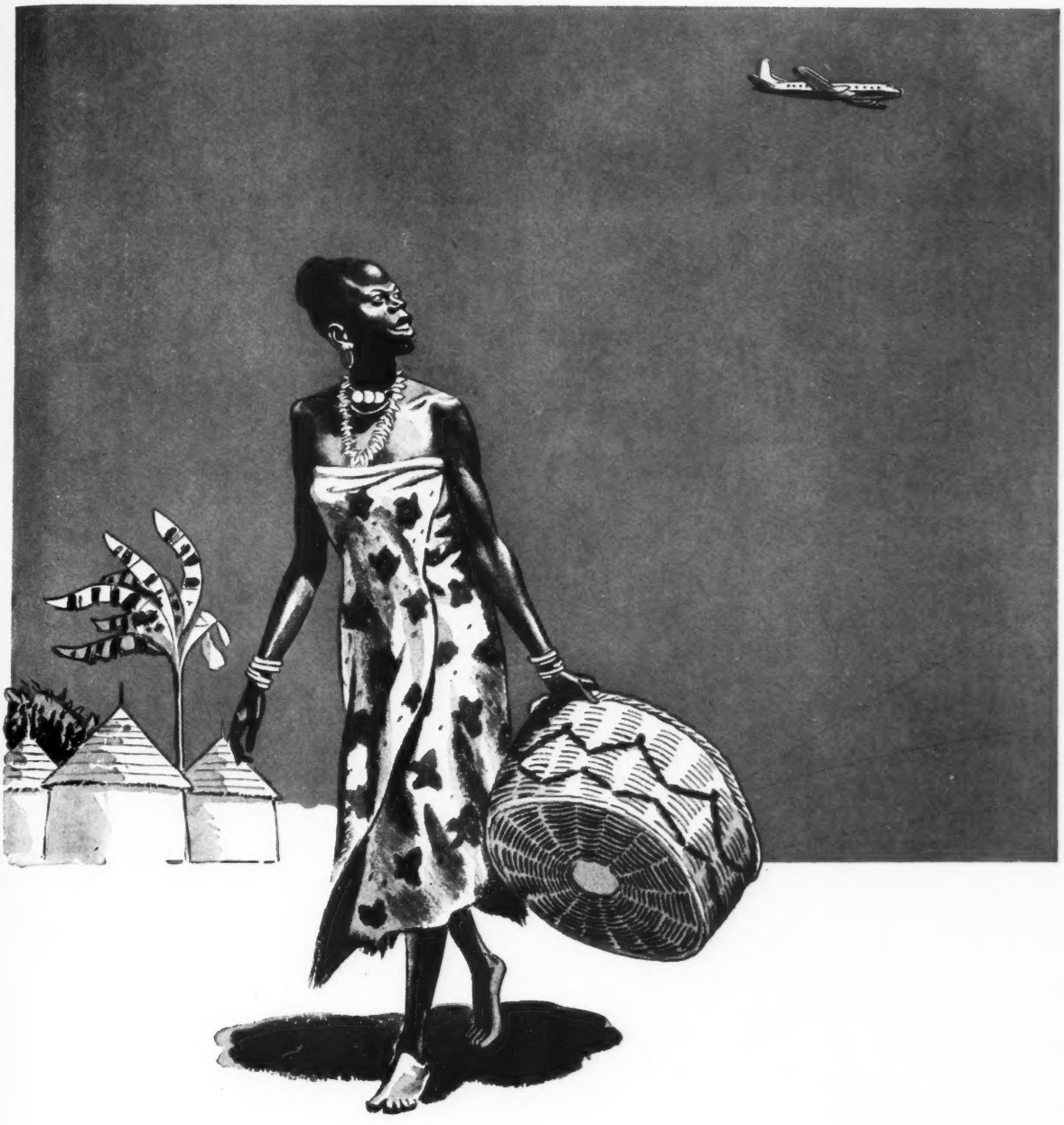

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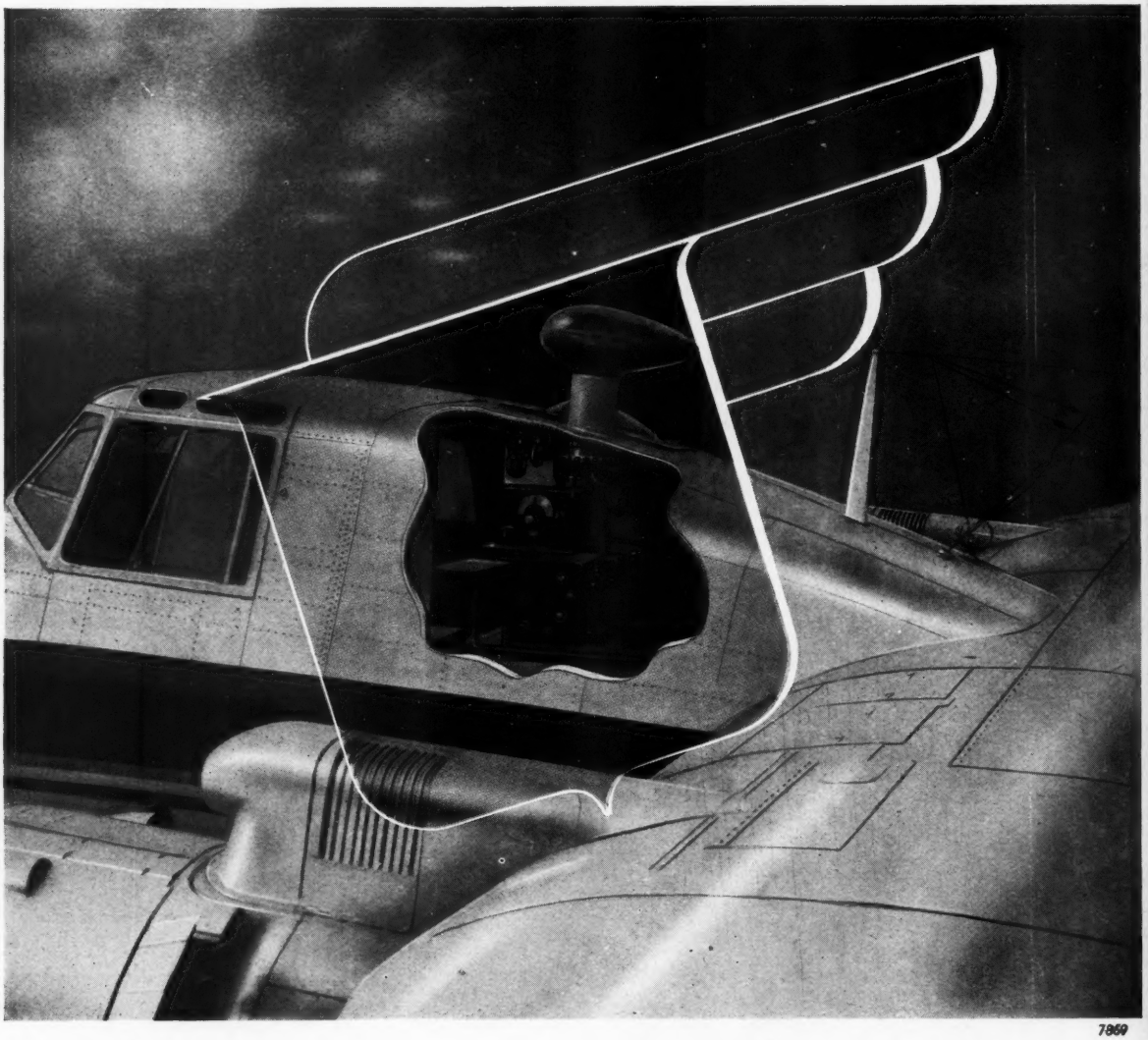

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